

PAGE/LADSON (8JE591): EXCAVATION OF AN
EARLY HOLOCENE OCCUPATION SITE
IN THE AUCILLA RIVER, FLORIDA

By

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Brinnen S. Carter

This document is dedicated to my dead father, Brinly Stewart Carter.

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Abstract of Dissertation Presented to the Graduate School
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The early Holocene in north Florida encompasses dramatic changes in landmass, climate, and biota. Foraging theory and climatic change models predict that there should have been a change in hunting/foraging strategies when climates became dramatically warmer around 10,000 BP. Pre-existing hunting/foraging strategies and low human populations in north Florida seem to have partially mitigated those changes. A review of dated early Holocene projectile points from the Southeast suggests that different projectile point styles were made concurrently by the same groups, or were made concurrently by different groups. This interpretation is very different than the traditional horizon-style interpretation of changing projectile point.

Excavations on land and underwater at the Page/Ladson site (8Je591) yielded dated projectile points, scatters of stone, bone, and wooden material from an early Holocene camp site, and significant environmental information about the Holocene transition in North Florida. Analysis of the artifact scatter suggests the underwater site component was used as either a work area or a disposal area for an adjacent upland site. Analysis of

individual stone artifacts suggests that so-called “bola” stones—here termed handstones—were manufactured nearby. A shallow depression on an inundated soil horizon is interpreted as a hearth or smudge pit. Vertical stakes driven into the same surface are likely the remains of a camp-related structure, or possibly a burial.

Evaluation of bone and antler tools from the Page/Ladson site and Little Salt Spring suggests that the extensive Middle and Late Archaic osseous tool tradition begins prior to 9,500 B.C. and is derived from the late Pleistocene Paleoindian tool tradition. Tool types include antler points, awls, beads, billets, bone pins, cups, digging implements, dippers, handles, hoes, and multi-function tools. Some of these items may have had significant ceremonial value.

CHAPTER 1 INTRODUCTION AND LITERATURE REVIEW

Study Objectives

The primary goals of this dissertation are describing and interpreting the early Holocene artifacts and deposits of the Page/Ladson site (8Je591). While some components of the underwater deposits have been described elsewhere (Dunbar et al. 1988; Dunbar 1996), this is the first comprehensive report on a substantial part of the excavated remains. As part of this dissertation, previous late Pleistocene and early Holocene archeological work in Florida will be summarized. The Page/Ladson site setting, site stratigraphy, artifacts, and features will be described. Radiocarbon dates associated with diagnostic points make the Page/Ladson site particularly important for refining a chronology of point types in the Southeast.

Ground stone tools found on the inundated paleosol on the Page/Ladson site suggest a ground stone manufacturing process that has not been previously documented or described. Reduction sequences for several other lithic tools will be proposed on the basis of finds from Page/Ladson and contemporaneous sites. The overall goal of addressing stone tools from these sites is to revisit and analyze Bullen's (1975) categories of Florida's early Holocene diagnostic points to reflect regional trends, chronologies, and type names. The other objective is to update Purdy's (1981:24-32, Fig. 10) and Milanich's (1994:53-58) characterization of the early Holocene tool assemblage to reflect data gathered from sites in the last ten years.

An important result of refining Purdy's and Milanich's work will be to establish more precisely the chronological position of side-notched points, unfluted lanceolate points, and corner-notched points with carbon dates from Page/Ladson (8Je591), 8Le2105, and Dust Cave (1Lu496). Taken together, these dates solidly push back the date of origin for notched points past 10,000 BP, suggesting that the origin of notched styles is within a late Pleistocene, unfluted lanceolate tool tradition (Dalton, Cumberland, Suwannee/Simpson) (Goodyear 1982), as suggested by Wyckoff (1999). An explanatory model for changes in projectile point sizes and shapes from late Pleistocene lanceolate to early Holocene notched will be proposed based on changes in the functional requirements for those tools.

Another objective of this dissertation is to propose an idealized bone tool assemblage for the Earliest Archaic that complements the stone tool assemblage. The proposed assemblage will be based on examples from the Page/Ladson site and Little Salt Spring, with reference to the assemblages from Dust Cave (Goldman-Finn and Driskell 1994), Windover (Penders 2002), and Stanfield-Worley Rockshelter (DeJarnette, Kurjack, and Cambron 1962) (Northern Alabama).

Geography of the Page/Ladson Site: The Aucilla River in Southeastern Context

What is considered the Southeastern United States depends largely on the investigator. Bruce Smith (1986) surveyed a number of investigators and suggests that the size range of the Southeast varies depending on the time period that interests an investigator (Figure 1.1). Despite these variations, during the Late Pleistocene/Early Holocene, the Southeast likely encompassed the entire area south of the glacial and periglacial areas of Eastern North America. As a practical matter, this dissertation will not discuss sites north of the Tennessee/Carolina's northern border, although the

similarities in diagnostic points and stone tool assemblages suggest there was widespread communication among all Southeastern inhabitants, even ones north of that modern political border (see Anderson 2002, 1996; Dincauze 2002, for overviews of these areas).

Because the Florida peninsula and adjacent subregions are the foci of study, it is critical to define the Florida peninsula around 10,000 BP. Fairbridge (1961, 1983) synthesized world-wide changes in sea level, including changes for the Gulf of Mexico. Since that original study, several investigators have suggested alternative sea level curves (Fairbanks 1989, Stright 1995) (Figure 1.2). These are reviewed in Faught (1996). Using the sea level curves in conjunction with modern bathymetry, several investigators have proposed shorelines during the late Pleistocene and early Holocene ranging from 60m to 40m below average modern sea level (AMSL) (Dunbar et al.1988; Faught 1996), roughly doubling the size of the Florida peninsula (Figure 1.3).

Despite the relatively good understanding of sea level changes' net effects on available land areas, several critical factors have not been well researched. The most important of these for archaeological purposes is tracing Florida rivers out to the Pleistocene shoreline and defining springs and karst features active during the Pleistocene (Faught 1996: Chapter 2). A number of submerged springs have been recorded on the Gulf and Atlantic coasts of Florida (Roseneau et al. 1977:Appendix A), suggesting that freshwater would have been widely available on the now-submerged continental shelf especially near the Pleistocene shoreline where the Floridan aquifer was forced to the surface by hydrostatic pressure from the sea. Prominent underwater features, such as the Florida Middle Grounds, submerged sinks, and exposed limestone reefs, suggest that currently-submerged areas of the Florida Platform were exposed long enough for karst

features to develop. Dunbar (1991) argues convincingly that late Pleistocene and early Holocene peoples focused on karst features, making the archaeological task of defining their offshore exposures a priority.

The Page/Ladson site lies in and around the Aucilla River, a karst river that originates south and east of the Thomasville, Georgia, airport. The river flows through the Tallahassee Hills geological subregion on the surface to the edge of the Cody Scarp, the physiographic dividing line between the Tallahassee Hills and the Gulf Coastal Lowlands. The Tallahassee Hills are characterized by thick confining beds of Hawthorn clays of Miocene age, while the Gulf Coastal Lowlands have relatively thin Hawthorn clays and the underlying Floridan aquifer is unconfined. The Aucilla flows through surface and subsurface channels on the Gulf Coastal Lowlands to the Gulf of Mexico. The area immediately around the Page/Ladson site is a mixture of outcropped Suwannee limestone, vegetated sandy rises (probably late Pleistocene dunes), and broad areas of bedrock---thinly covered with diogenic clays and sands, peats, and inundated soils.

The Aucilla is tidal as much as five miles inland, and its level within this area is controlled by the sea. The upper Aucilla River drains a large number of swamps and wetlands and the resulting river water is stained dark brown. The clear, spring-fed Wacissa River---flowing through a series of braided channels---joins the Aucilla at several points 4-8km from the Gulf of Mexico. The Page/Ladson site is located in and around one of the intermittent surface channels that characterize the Aucilla Sinks portion of the river.

Page/Ladson is also located in the center of the Wacissa chert quarry cluster (Upchurch et al. 1982:108). Exposures are currently present both in the bed of the

Aucilla River and in the braided channels of the Wacissa River to the west of the Aucilla. Far greater amounts of accessible chert were available for manufacturing stone tools under the lowered water table, erosional regime of the late Pleistocene and earliest Holocene. Chert from the Wacissa Cluster "consists of microspherulitic chalcedony with a foraminiferal grainstone fabric" (Upchurch et al. 1982:109), the result of silicate replacement of Suwannee limestone. The immediate area around the Page/Ladson site on the Gulf Coastal Lowlands has been substantially different from the adjacent Tallahassee Hills since the Pliocene (Hendry and Sproul 1966:10-15). The period around 10,000 BP was no exception. Topographic relief is lower, ranging to only about 35 feet, even with no water in the stream courses. Soils are fine sands and clayey-sands instead of sandy-clays, with a lower iron content. Aeolian sand deposits in the form of dunes and sand caps are common both near the current shoreline and inland to the Cody Scarp, the traditional boundary between the two subregions (Coastal Environments, Inc 1977:127). At 10,000 BP, Page/Ladson was most likely located on the northern fringe of a broad, open oak savanna that extended southward. Intersecting that low-relief savanna were intermittent karstic rivers that supported mesic vegetation. Erosion around Page/Ladson had exposed large boulders of high-quality chert of the St. Marks and Suwannee Formations (Upchurch et al. 1982:14). Early Holocene vegetation around Page/Ladson will be discussed as part of the underwater excavations.

Environmental Change at 10,000 BP

The most important environmental transition that humans have undergone in the last 25,000 years was the last deglaciation---driven by late Pleistocene global warming. Deglaciation appears to have begun around 15,000 BP and continued until around 5,000 BP, when deglaciation-driven sea level rise slowed dramatically (Figure 1.4)(Fairbanks

89). During this period of general climate warming, there were periods of re-glaciation, rapid deglaciation, and temporary climatic stability. The final rapid deglaciation began very close to 10,200 BP (Clark et al. 2001; Grimm et al. 1993), which has been confirmed by ice cores taken from the summit of the Greenland Ice Sheet (Figure 1.5). The initiation of this event is referred to as the late Pleistocene/early Holocene boundary. It now appears that the rate of environmental change around 10,000 BP was the greatest in the last 15,000 radiocarbon years (Grimm et al. 1993). This likely had profound implications for human groups living through this transitional period---and thus for investigators of human activity during this period.

The southeastern United States appears to have been buffered from the large glacial and peri-glacial environmental transformations that influenced northeast and north-central North America. The greatest change appears to have been the general warming of peninsular Florida and an increase in the difference between summer highs and winter lows (decreased equability). Increases in rainfall begin at the initiation of the Preboreal and remain relatively high and seasonal, but gradually decrease into the mid-Holocene Hypsithermal event (circa 6,000 BP). By 8500 BP, freshwater aquifers, streams, and lakes had reached near-current levels (Watts 1983), although the climate was becoming warmer and drier (Adams and Faure 1997).

Lowered sea levels shifted the late Pleistocene convergence zone between the heavily continental-influenced climate of northern Florida and the Gulf of Mexico-influenced subtropical climate of peninsular Florida southward by 120km. As a result, Page/Ladson---140km inland---was 7C to 15C degrees cooler in the winter and as warm in the summer as it is today, at least until the post-Younger Dryas warming event (Adams

and Faure 1997). Without the moderating marine influence prior to 10,000 BP, the climate favored drought-tolerant xeric and mesic species (hickory and oak over pine).

The early Holocene environmental history of the Page/Ladson site is also directly related to the environmental transformations that resulted from periglacial Lake Agassiz changing drainage outlets (Clark et al. 2001; Teller et al. 2002). The most recent data suggest that two rapid drainage switches from the St. Lawrence to the Mississippi drainage at 10,100 BP and 9,900 BP likely introduced large volumes (circa 5,000km³) of glacial meltwater into the northern Gulf of Mexico. Although there is some imprecision in the dating, Emiliani et al. (1976) and Kennett and Shackleton (1975) documented the large influx of glacial meltwater into the northern Gulf of Mexico by tracking a dramatic shift in cold/warm water foraminifera and δO_{18} ratios from piston cores from submerged DeSoto Canyon and in the western Gulf.

The local climatic effects of this influx on adjacent Gulf coastal ecosystems have not been fully explored, but the cold surface currents along the modern California coast provide a good modern homolog. Spring and fall frontal rains were likely suppressed along the late Pleistocene/early Holocene Florida to Texas coast due to lower evaporation rates off glacial surface waters. Additionally, convective summer rains were likely substantially suppressed during the influx period. Summer temperatures were also probably reduced during the influxes. There is some suspicion among paleovegetation specialists (Paul Delcourt and Hazel Delcourt 1996, personal communication, cited in Adams and Faure 1997) that the Gulf Coastal Lowlands was a dry, savanna-like environment during the deglaciation period (18,000 BP to 10,000 BP) with warm, dry summers and cool, wet winters.

Watts et al.(1992) note that there is a spike in spruce pollen in Camel Lake---100km west of the Aucilla drainage---from 14,000 to around 10,000 BP. Spruce is not currently found south of the >1500m peaks of the southern Appalachians. Its presence around Camel Lake would tend to support the idea of moderate-to-cool spring through fall temperatures along the northern Gulf coast at the time. Alternatively, it could signal the ongoing re-seeding of spruce in the north Florida area by seasonally-transhumant mastodons or finches moving down from the piedmont and ridge-and-valley regions (S. David Webb 2002, personal communication). On the Gault site in Texas, this period is marked by the organically enriched Royalty paleosol that develops under lower water table conditions through the intermittent saturating of a developing A-horizon (Collins and Hester 2001). These data also suggest that the Tallahassee Hills subregion and the adjacent Gulf Coastal Lowlands were on average drier and cooler than modern conditions.

Several authors have summarized North Florida plant communities circa 10,000 BP (Adams and Faure 1997; Delcourt and Delcourt 1984; Delcourt et al. 1983; Watts 1980, Watts and Stuiver 1983; Watts et al. 1992). At Sheelar Lake, near Gainesville, Florida, Watts and Stuiver (1983) found that pine and oak dominated the species assemblage of pollen after 10,000 BP, with reduced amounts of hickory, juniper, upland herbs, and mesic trees. This suggests that the limestone and sand ridges to the east of the Tallahassee Hills subregion were also substantially drier than they had been in the late Pleistocene, with fire-tolerant pines coming to dominate the assemblage along with patches of mesic oaks. Camel Lake pollen records indicate a relatively mixed set of upland trees, with pine, oak, and hickory dominating the assemblage prior to 10,020 BP.

After a hiatus in the pollen record of about 2,000 years, the assemblage is dominated by pine and cypress (Watts et al. 1992). Delcourt et al. (1983), characterize the 10,000 BP north Florida plant community as one of mixed oak-hickory-southern pine with the possibility of a broad, open oak savanna on the now-submerged coastal lowlands. From a human use perspective, there is a spike in oak and hickory pollen centered at 10,020 BP. Early Holocene hickory nut and acorn use is well-known from archaeological sites around the Southeast (Smith 1986).

There is no evidence of significant faunal change once the megafaunal extinctions were complete in Florida (likely prior to 10,500 BP), although this may be the result of a lack of high quality subsistence data from archaeological sites older than 8,000 BP rather than the result of a real change. Proxy data in the form of bone tools (this study) and plant remains (Doran 2002, Broom et al. 1997:82-107) suggest a strong reliance on deer and seasonally-available fruits and nuts in the north Florida subregion. This contrasts with Dust Cave in Northern Alabama, where there seems to have been an early emphasis on seasonally available waterfowl and small mammals (Goldmann-Finn 1994). However, there are numerous open, clay-lined lake basins in north Florida that could have been seasonally-flooded vernal pools and playa lakes, habitat seasonally open for migratory birds, small reptiles, and amphibians. Nalcrest, a roughly contemporaneous site in south-central Florida is strategically located near one of these early Holocene seasonal lakes. The small tool assemblage (Bullen and Beilman 1973) was speculated to have been used to fashion reed baskets and other goods, but it could also be used to grate roots and tubers and to create feather garments and ceremonial items. Without a better

sample of early Holocene sites near these seasonal resources, it is impossible to resolve their contribution to human subsistence.

Sealevel rise and salinity changes related to glacial meltwater influxes to the northern Gulf of Mexico also likely restructured the near-shore and pelagic fish populations temporarily. Unfortunately, little can be said about human coastal adaptations on the Gulf of Mexico at 10,000 BP because no coastal sites have been discovered. With the coastline over 100km south of its current position, Page/Ladson site was a riparian site removed from strong coastal climate influences. This makes it difficult to fit the early Holocene component of Page/Ladson into a regional settlement model or to examine issues like yearly range because half the potential sites in the range are now submerged on the continental shelf and are only cursorily known (Faught 1996).

The recovery of a *Bison antiquus* skull with an imbedded projectile point tip (Webb et al. 1982) indicates there were bison herds in the area. Deer bone tools and unmodified antler have been recovered from early Holocene deposits on Page/Ladson. A range of freshwater reptiles and fish were recovered from early Holocene levels at Page/Ladson, indicating there were surface water bodies connected to Page/Ladson at the time. Those water bodies could have been as small as cenote ponds or as large as open marshes.

Paleoindian/early Archaic or late Pleistocene/early Holocene

North American archaeology has struggled for at least fifty years (Griffin 1952) with the definition and delineation of the early cultural periods of eastern North America. Griffin (1952) divided the time before 5,000 BP into two periods, the Paleoindian and early Archaic, the former hunting megamammals and producing fluted points, the latter more focused economically on local resources but retaining small band sizes and exogamous marriage. These broad cultural characterizations are problematic because

they tend to create perceived socio-cultural boundaries through time where no real boundaries may have existed. They also de-emphasize important changes in material culture, archaeological features, site size, and site distribution, that reflect critical cultural changes. Smith (1986) recognized the problem and adopted the combination of arbitrary and environmental chronologies suggested by Delcourt et al. (1980), based on Holocene time units. The early Holocene covers the period 12,500-8000 BP, the middle Holocene 8000-5000 BP, and the late Holocene from 5000 BP to present. This dissertation falls in the middle of the early Holocene time unit (12,500-8000 BP) (Delcourt et al. 1980).

The distinction between putative Paleoindian cultures and early Archaic cultures is often tied to the distinction between the late Pleistocene and the early Holocene geological periods and the distinction in subsistence practices (Griffin 1952; Mason 1962; Milanich 1994:38-40; Milanich and Fairbanks 1980:36-38; Smith 1986). Paleoindians are viewed as Pleistocene big-game hunters with a highly mobile lifestyle. Kelly and Todd (1988) characterize them as high technology foragers. By contrast, early Archaic (Holocene) populations are seen as generalized hunter/gathers with less residential mobility than Paleoindians, but higher logistical mobility (Anderson and Hanson 1988), or collectors (Binford 1980). Despite the proposed clarity of the distinction between Paleoindian and early Archaic modes of existence and their material correlates, the characteristics that distinguish the two in social terms and the precise timing of that transition is unknown in Florida or in adjacent states.

If the Paleoindian/early Archaic period transition is tied exclusively to changes in subsistence rather than geologic periods, the lack of many megafaunal remains on sites in the Southeastern United States dating post-10,500 BP suggests that the Archaic may

begin earlier than 10,500 BP in the Southeast. If one uses subsistence criteria, the transition to an "Archaic" subsistence mode was delayed substantially---extending to as late as 7,000 BP---on the Great Plains (Cassells 1993:28-32) and periglacial areas where human groups continued to rely heavily on migratory bison, elk, and reindeer (Johnson 1996). Defining the difference between the Paleoindian and Archaic periods by a change in subsistence strategies---and quantifying that change in terms like mean prey size and number of annual residential moves---is outside the scope of this dissertation. Despite the differences in subsistence regimes from Pleistocene to early Holocene, burial practices appear to be very similar during the Paleoindian and early Archaic, most consisting of burying extraordinarily fine projectile point examples (Anzick, Sloan, Wakulla Springs)(Wilke et al. 1991; Morse 1997:92-95; Jones and Tesar 1999) and red ochre (Anzick and Wakulla Springs) with individuals. Until archaeologists systematically re-evaluate the social criteria and archaeological bases used to divide the Paleoindian and early Archaic, it does not seem wise to use these terms.

In view of the difficulty in actually determining the Paleoindian/early Archaic sociocultural boundary, the widely acknowledged geological/environmental periods will be used when time references are made, rather than the archaeologist-constructed periods. The Pleistocene/Holocene boundary is considered by most geologists to date to 10,200 BP (11,200 CALYBP), or the initiation of the final dramatic sea level rise. For purposes of this dissertation, the period between 12,500 BP and 10,200 BP will be called the "initial Holocene" and the period between 10,200 BP and 8,500 BP will be the "early Holocene", with the boundary event as the termination of the Younger Dryas, which appears to be at circa 10,200 BP.

Smith's (1986) broad Holocene time-frame is not sufficiently detailed to consider the temporally-limited period that dates the Page/Ladson occupation (Table 3.1). As Delcourt et al. (1983) have abundantly demonstrated, there are many scales at which environmental transformations occur, from weather events that effect less than a square mile for as little as a minute to tectonic events separating and reforming continents. Humans, like plants and other animals, have to live in---and respond to---the smallest scale environmental changes first, especially if they represent imminent death or a potential shortage in subsistence commodities for the individual or group for more than 15 days (Binford 2001:28). Environmental stochasticity between 12,500 and 8,000 BP was high, with biosphere transformations occurring in as little as 3-50 years (Alley et al. 1993). Humans, through the mitigating factors of culture (*sensu* Binford 2001:462) and technology, successfully coped with a series of short-term environmental changes that comprised longer-term environmental change. Subsistence risk deriving from short-term environmental changes are mitigated in ethnographically-known hunter-gatherer groups by low population densities, mobility, knowledge of consumable---but unexploited---resources, storage, and food sharing (Kelly 1995:125-130). With this in mind, relatively rapid transformations in human material culture should be expected when rapid environmental transformations occur, unless the resources targeted by humans prior to the event are not seriously effected by that climatic change.

Forager Theory: Sea level rise, Packing, and Foraging Change

Everything known about early Holocene north Florida peoples suggests they were hunter/foragers or hunter/collectors (*sensu* Binford 1980), without knowledge of horticulture or agriculture as it is historically known. One of the techniques used to interpret prehistoric hunter/forager/collectors is ethnographic comparison, both through

examining homologous (Binford 2001:142) and analogous attributes (Wylie 1985).

Developing general foraging models based on modern and historically-known hunter/foragers has advanced considerably recently (Bettinger 1991; Kelly 1995; Binford 2001), and now includes systematic evaluation of all ethnographically-known foragers in terms of environmental contexts, food choices, residential mobility, division of labor, and other traditional anthropological research emphases.

The objective of most of these evaluations is to predict what will be found in the archaeological record from extending the models into areas where there were no groups from which to derive data for model formulation. One drawback of this approach is that ethnographically-known foragers are often in environments far removed from the environmentally moderate mid-latitudes, and far more marginal in terms of temperature (extremely hot or cold), rainfall (desert or rainforest), and primary plant productivity (low or high) (Binford 2001:133). Binford (2001:133) argues strongly that despite this empty middle where pastoralists, agriculturalists, and complex societies developed, it is still reasonable to apply other applicable knowledge to the problem of archaeologically-known hunter/foragers, if it is relevant and productive to do so. Binford's objective is to use existing knowledge of environmental variables in places where all ethnographically-known hunter/foragers lived to develop a "frame of reference" to view how archaeologically-known hunter/foragers might have interacted with their environments and arranged the adaptive components of their culture. To my knowledge, no other author has attempted to use explicitly the entire body of ethnographic hunter/forager data to develop a comprehensive "theory of human hunter/foragers." Binford (2001:468-472) makes a strong case that if an investigator can establish the environmental conditions

(temperature, precipitation, plant and animal communities) of an area, the model will predict the group size, packing threshold (where all groups are circumscribed), niche breadth, and division of labor of a group, within a limited range of variability.

The concept of packing is important because it is a more complex treatment of population density. Instead of examining human population density alone, it examines human population density, resource availability, and population density and resource availability in adjacent areas. Hunter/gatherers are circumscribed by other groups when they cannot use mobility as one method of mitigating risk of resource failure and have to intensify resource use in order to meet basic food needs. Packing is an important consideration in the Southeast because minute changes in sealevel reduce the shelf size of Gulf and Atlantic coasts disproportionately compared with other areas of the United States. Reduction in available terrestrial habitats, coupled with early extinction of large game animals in the southeastern United States may have induced packing sooner in the southeast than in the mid-continent, intermontane west, and west coast over the course of the early Holocene. Packing also may have promoted early adoption of aquatic resources along the Gulf of Mexico. There is certainly evidence for adoption of marine resources along the Peruvian coast prior to 11,000 BP (Sandweiss et al. 1998), and ongoing use of the resource into the early mid-Holocene (Quilter et al. 1991). The idea of increased sea levels inducing culture change is not new (Binford 1968), but it has surprisingly not been pursued as general research hypothesis for predicting the location of, and locating submerged sites. The terrestrial model predicts that one result of circumscription is intensified use of terrestrial plants and---where available---the incorporation of aquatic resources into the subsistence regime (Binford 2001:384-385).

Preliminary evidence---the use of forest plant products (i.e. nuts, fruits, berries)---suggests early Holocene hunter/gatherers in the southeast United States were transitioning to a more scheduled yearly round with fewer residential moves and more logistical foraging in the areas around the residential sites (Sassaman 1996), in general targeting food resources with lower total return rates due to higher handling times, but with more knowable and predictable search costs.

Although all the variables that would be needed to do this evaluation on data from early Holocene north Florida are not known, the environmental data are well established and there are enough previously excavated sites to attempt an analysis. That more complete work is not within the scope of this dissertation, but the previously-mentioned environmental data suggest that there may have been new environmental niches opening around 10,200 BP near the Page/Ladson site that were attractive to humans, including upland clay and sand hills with hickory and oak groves for nut harvesting and fall hunting, open, well-watered savannas that could support bison herds, mixed, open pine/oak uplands that supported deer and bison populations, and large, seasonally inundated marshes supporting turtles, fish, and migratory birds. Of all those resources, the only ones surviving the late Pleistocene extinctions that remained inter-regionally migratory were birds.

Long-term restructuring influences on initial Holocene human foraging were the restructuring of terrestrial prey species and lower mean prey size. The difference in prey species lifeways likely also conditioned seasonal human residential and logistical movements. Deer, turkey, and other medium sized animal species are not regionally migratory. Effective hunting of these species would favor extensive knowledge about

local areas rather than less detailed knowledge about broad, regional areas. Reduction in human foraging range size did not necessarily signal a decrease in human nutritional status or an increase in prey search times. However, it may signal a combination of reduced food resource ranges, circumscription of base residential groups ("bands" in Anderson and Hanson 1988), and net increases in population density, if not net population. This argument is testable in that there should be early Holocene sites, possibly only limited-use temporary camps, in areas previously unoccupied.

Fluctuations in effective temperature (ET) were critical from 12,500 to 8000 BP. For the purposes of the period immediately around 10,200 BP was the substantial rise in effective temperature along the Gulf of Mexico. According to the terrestrial model (Binford 2001:454), increases in effective temperature would result in the concentration on terrestrial plants in "packed" conditions. It also results in increase in proportion of diet contributed by women in modern foraging populations. Additionally, the long-term knowledge of the Gulf Coast societies likely included an understanding of 1) what resources were edible in the environment and 2) which edible resources were able to weather the Younger Dryas cold event.

In view of these two factors, it is appropriate to ask what strategy would most effectively cope with a new environmental changes, initiated circa 10,200 BP. It seems like a mixed strategy would provide the most net resources on a seasonal basis. Males would continue to hunt larger game animals year round. Women intensified collection of edible fruits, nuts, and tubers through the growing season. Both sexes trap small game animals year-round, and possibly fish in the spring. It is a risk reduction strategy (Kelly 1995:168-170). Both sexes rely on knowledge of edible plants and animals and schedule

of availability to improve year-to-year stability of food resources. The widespread apparent homogeneity of lithic tool kits during the early Holocene for the southeast suggests the maintenance of social networks as insurance for bad seasons in which local food alternatives are insufficient to sustain the local residential group. The clustering of early Holocene sites in Florida (see below) suggests that there are core ranges for residential moves, and foraging ranges that acted as buffers between residential groups.

Previous Pleistocene and early Holocene Archaeology in Florida

The Pleistocene and early Holocene occupation of Florida was recognized early in the history of North American archaeology. Although initially focused on finds of human remains along the east coast at Melbourne and Vero Beach (Sellards 1917; Hrdlicka 1918; reviewed by Meltzer 1983), the focus for Florida investigators shifted to the center part of the state---along the karstic Santa Fe, Suwannee, Ichetucknee, and Silver Rivers. Clarence Simpson---working for the State Geological Survey---recovered a number of diagnostic projectile points, ivory foreshafts and foreshaft fragments from the Ichetucknee River (Simpson 1948). The presence of Folsom and Clovis diagnostic artifacts and artifacts made from extinct fauna along these karstic rivers suggested that other similarly-situated waterways might be fruitful places to explore.

The importance of water to both humans and the game animals---combined with a broad belief in a very dry late Pleistocene Florida---led to the development of the Oasis Hypothesis, first proposed by Neill (1964), based on his excavations and observations in and around Silver Springs and Trilisa Pond. Dunbar (1991) formalized and tested the hypothesis. The Oasis Hypothesis posits that humans and game animals congregated around karst features in Florida because they offered one of the few locales where near-constant water was available in a much drier, over-drained Pleistocene Florida. As noted

by Milanich (1994:40-44) and Dunbar (1991), subsequent data collected on the location of isolated finds of Paleoindian projectile points have been consistent with the Oasis Hypothesis. However, Tesar (1994:99-104) has pointed out the weaknesses of relying solely on isolated finds for determining time ranges and intensities of occupation. Additional site-based data needs to be tested against predictions derived from the Oasis Hypothesis before it can be accepted fully.

The distribution of Florida late Pleistocene and early Holocene sites suggests that two socio-geographic phenomena are occurring. First, at the time of deposition these sites would have all been located in upland areas that were generally over-drained and dry (Watts 1983). However, there were likely more plentiful and more evenly-distributed water sources on what is now the outer continental shelf (between -30 and -60msl) as a result of the flattened and lowered Floridan Aquifer. The relatively flat, incised nature of the karst terrain in the northwest Florida coast would have encouraged water courses to disappear into underground rivers as they moved off the Cody Scarp and for the Floridan aquifer to emerge relatively close to the coast, displaced upward by underlying salt water. Further south on the Peninsula, the pattern would be reversed with water percolating into the high sand hills of the central uplands and emerging in the poorly-drained terraces formed by earlier Cenozoic higher---and lower---sea level stands. Second, there is geographic clustering of the known sites (Table 1.1, Figure 1.6), much as there is clustering of Florida chert resources (Upchurch et al. 1982)(Figure 1.7). This site clustering may have to do more with the co-occurrence of water sources, chert resources, closely-spaced, diverse ecosystems, and game resources, than it does with the location of water resources or chert resources alone.

Classifying sites and modeling the regional settlement pattern of early Holocene peoples has been a major focus of previous excavations. While the Oasis Hypothesis has been extended to include early Holocene populations and used to explain the high discovery rate for points in karst regions, Daniel and Wisenbaker (1987:173-175), Hornum et al. (1996:230-235), and Austin and Mitchell (1999:110-111), have all classified their sites in terms of the regional early Holocene settlement system, and speculated about the other types of sites in the system, the latter two extending the work of Anderson and Hanson (1988) and Daniel (1998:198-201) on early Holocene settlement patterns on the upper Coastal Plain of South Carolina and North Carolina, respectively.

On the strength of site size and stone tool numbers and diversity, Daniel and Wisenbaker (1987:173-175) suggest that Harney Flats was a Paleoindian and early Archaic base camp, located along a strategic ecotone adjacent to several high-productivity ecosystems (marshes, upland hammocks, river valley). Hornum et al. (1996:234) suggest that 8Le2105 was either a base camp or domestic camp on the basis of stone tool diversity, geographic location (on the Cody Scarp), and a unique type of feature discovered on the site. The feature appeared to be a pit into which early Holocene people swept and buried a large quantity of lithic waste flakes, potentially indicating a concern that the waste-flakes not cut bare body parts, especially those of the young. Austin and Mitchell (1999:198) characterize the Jeannie's Better Back Site (8Lf54) as a base camp or habitation site based on the functional diversity of the stone tools and the site's strategic position at the confluence of Bethel and Mill Creek drainages, only about 1.6 km from the Suwannee River and at one outlet of the over 20,000 hectare San Pedro Bay marsh.

Several investigators (Austin and Mitchell 1999:110-112; Tesar 1994:81-82; Daniel and Wisenbaker 1987:167-169; Milanich 1994:67-70) have suggested that the early Holocene (early Archaic) land use pattern was one in which groups established base camps on ecotones near water, especially those with ready access to more than two ecosystems, and made forays into more homogeneous ecosystems for hunting, fishing, gathering, and other resource procurement activities, a pattern similar to that suggested by Anderson and Hanson (1988) for the Upper Coastal Plain and Piedmont of South Carolina and the pattern observed on the Savannah River Plant (Sassaman 1996:Figure 4.9). Unfortunately, systematic intensive survey of these "outlying" areas has not been accomplished in Florida to the extent necessary to determine whether smaller "day-camps" or "over-night" camps are present in these more homogeneous ecosystems. Because funding of site survey in Florida is principally through private development and public road-building---and large tracts of land are privately-held---there has not been an attempt to locate and document these smaller sites. By the same token, the growing state site file database has not been used to address questions of late Pleistocene or early Holocene, although aggregating the sample may provide the first statistical confirmation of this phenomenon.

Obtaining valid dates for sites is one of most important parts of archaeological research. Radiocarbon dates have been the traditional method for dating Early Archaic sites in the Lower Southeast. Unfortunately, most Early Archaic sites in the Southeast do not have good radiocarbon control and contain only stone tools (Sassaman 1996). However, by aggregating all the Southeastern sites that have the combination of dated strata and typed projectile points from those dated strata, we can generate a better picture

of the duration and intensity of individual projectile point traditions, the “index” artifacts (*sensu* Renfrew and Bahn 2001:110-135) of the Early Archaic period. Combining the dates and tool associations (Table 1.2, Figure 1.8) illustrates that there is substantial overlap between lanceolate, eared lanceolate, side-notched, and corner-notched points.

This is an especially important point because it argues strongly against a strict “horizon” perspective, at least as it has been applied to “diagnostic” material culture for the Paleoindian and Archaic Southeast (e.g. Anderson, O’Steen, and Sassaman 1996:Fig. 1.2). Substantial and ongoing overlap among the different diagnostic points suggests that successive projectile point forms were developed within the context of earlier styles, and co-occurred with those earlier styles for perhaps as much as 350-year time periods. In this context, Page/Ladson is important because both side-notched and corner-notched projectile points co-occur---with radiocarbon dates from the site. The site serves as an additional datum point for working out the timing of the addition of corner-notched styles to the existing side-notched style. Moreover, the well-dated and complimentary bone tools from Page-Ladson, Little Salt Spring, and Dust Cave provide an opportunity to define the types of bone tools manufactured by Early Archaic individuals, a task that has not been attempted.

Paleoindian and Early Archaic archaeological sites and finds have been summarized by several authors, including Tesar (1994:85-89), Austin and Mitchell (1999:9-16), and Hornum et al. (1996:Chapter 1) for North Florida, Daniel and Weisenbaker (1987:146-161) and Horvath et al. (1998:3.1-3.4) for Central Florida, and Goodyear et al. (1983) for the Tampa Bay region, and Milanich (1994:37-59) for the state as a whole. Goodyear (1999) has recently summarized work on Paleoindian and Earliest

Archaic sites in the Southeast. These works should be consulted for more in-depth discussions of the types and geographic distributions of Late Paleoindian and Early Archaic sites.

The remainder of this study is organized as follows. First, the chronology of excavation on the Page/Ladson site (8Je591) is detailed. Results of underwater excavations conducted by, or under the responsibility of the author are then presented. Four studies (soils, fauna, pollen, and archaeology) focus specifically on the Half-Mile Rise section of the Aucilla River. By examining these individual studies concurrently, we can more completely interpret the late Pleistocene/early Holocene transition as manifested on this site. Early Holocene lithic material manufacturing processes are described and discussed, focusing on projectile points and bola stones. Next, bone artifacts from Little Salt Spring and Page/Ladson are described and analyzed together as representing a significant portion of the period's bone tool assemblage. Conclusions are then drawn from the data.

Table 1.1. Early Archaic Site Clusters.

Cluster Name	Sites in Cluster	Site Materials	Site Features	E. Archaic Dates
Miami Ridge Cluster	Cutler Hammock Isolated Hammock sites	Human Remains Stone tools Fauna	Burials Isolated Points	circa 10,000 BP
Myakka River Cluster	Little Salt Spring Warm Mineral Spring	Human Remains Bone Tools	Discard deposits	circa 8,900 to 9,400 BP
Tampa Bay Cluster	Alafia River Harney Flats Bay-bottom points Colorado Site	Lithic Tools Isolated projectile points	Lithic Clusters	None
Silver Springs/ Oklawaha/ Paynes Prairie Cluster	Silver Springs Sites Bolen Bluff (Whitehurst Site)	Lithic Tools	Lithic Clusters	None
Santa Fe/ Suwannee/ Ichetucknee Cluster	Darby and Hornsby Springs Ichetucknee Run isolated finds Norton Site 8Gu1 8Lf54	Lithic Tools Bone Tools	Lithic Clusters Isolated Finds	None
Cody Scarp/ Gulf Coast Cluster	8Le2105 Wakulla Spring Page/Ladson Wacissa Bison Kill Site Johnson Sand Pit Ryan/Harley J&J Hunt	Lithic tools Bone tools	Burials Discard pits Lithic clusters Isolated Finds Quarry remains	circa 10,000 BP
Pensacola Cluster		Lithic tools	Quarry Deposits	None

Table 1.2. Sites with diagnostic points from dated contexts (with the exception of Little Salt Spring). Derived from Anderson (2002).

Site	Culture	14-C date	Minimum Calibrated Date	Intercept 5	Maximum Calibrated date	Original References
Little Salt Spring, FL	PCL	12030	13488	14076	15386	Clausen et al. 1979:611
Little Salt Spring, FL	PCL	13450	15414	16157	16796	Clausen et al. 1979:611
Cactus Hill, VA	PCL	15070	17496	18021	18611	McAvoy and McAvoy 1997
Cactus Hill, VA	PCL	16670	18100	19862	21670	McAvoy and McAvoy 1997
Cactus Hill, VA	PCL	15070	17496	18021	18611	McAvoy and McAvoy 1997, McAvoy et al. 2000
Cactus Hill, VA	PCL	16670	18100	19862	21670	McAvoy and McAvoy 1997, McAvoy et al. 2000
Cactus Hill, VA	PCL	16940	19551	20173	20825	McAvoy and McAvoy 1997, McAvoy et al. 2000
Cactus Hill, VA	PCL	19700	22582	23349	24181	McAvoy and McAvoy 1997, McAvoy et al. 2000
Cactus Hill, VA	PCL	9250	10239	10457	10636	McAvoy and McAvoy 1997, McAvoy et al. 2000
Cactus Hill, VA	PCL	10160	11360	11822	12321	McAvoy and McAvoy 1997, McAvoy et al. 2000
Johnson, TN	CL	11700	11174	13672	16444	Broster et al. 1991:8-9
Johnson, TN	CL	11980	13630	13896	15316	Broster and Barker 1992
Johnson, TN	CL	12660	12687	15300	17537	Broster et al. 1991:8-9
Cactus Hill, VA	CL	10920	12333	12964	13442	McAvoy and McAvoy 1997
Smith Mountain, VA	CL	10150	11342	11746	12323	Childress and Blanton 1997
Enoch Fork Rockshelter, KY	CL	10960	12357	12984	13738	Bush 1988:61, as cited in Tankersley 1990:82, 92
Enoch Fork Rockshelter, KY	CL	13480	14842	16191	17130	Bush 1988:61, as cited in Tankersley 1990:82, 92
Big Bone Lick, KY	CL	10600	11642	12731	13143	Tankersley 1985:41; 1989:36-37, 1990:82
Cactus Hill, VA	CL	10920	12333	12964	13442	McAvoy and McAvoy 1997, McAvoy et al. 2000
Rodgers Shelter, MO	DA	10200	10754	11804	12949	Crane and Griffin 1972:159
Rodgers Shelter, MO	DA	10530	10293	12455	13834	Coleman 1972:154
Puckett, TN	DA	9790	10692	11196	11881	Norton and Broster 1992:35, 1993
Dust Cave, AL	DA	10570	12177	12741	12932	Driskell 1996:320
Arnold Research Cave, MO	DA	8190	8180	9183	10188	Crane and Griffin 1968:69; Tankersley 1990:92
Arnold Research Cave, MO	DA	9130	9530	10239	11172	Crane and Griffin 1968:69; Tankersley 1990:92
Taylor, SC	DA	4665	4853	5409	5837	Michie 1996:249
Olive Branch, IL	DA	9115	9924	10237	10549	Gramly and Funk 1990

Table 1.2. Continued

Site	Culture	14-C date	Minimum Calibrated Date	Intercept 5	Maximum Calibrated date	Original References
Graham Cave, MO	DASN	9290	9603	10438	11233	Crane and Griffin 1968:84-85
Graham Cave, MO	DASN	9470	9559	10692	12107	Crane and Griffin 1968:84-85
Graham Cave, MO	DASN	9700	9605	11165	12865	Crane and Griffin 1968:84-85
Stanfield-Worley, AL	DASN	8920	9027	9986	11170	DeJarnette et al. 1962:85-87, Josselyn 1964
Stanfield-Worley, AL	DASN	9040	9147	10213	11226	DeJarnette et al. 1962:85-87, Josselyn 1964
Stanfield-Worley, AL	DASN	9340	9531	10557	11899	DeJarnette et al. 1962:85-87, Josselyn 1964
Stanfield-Worley, AL	DASN	9440	9552	10642	12085	DeJarnette et al. 1962:85-87, Josselyn 1964
Stanfield-Worley, AL	DASN	9640	9701	11110	12788	DeJarnette et al. 1962:85-87, Josselyn 1964
Dust Cave, AL	DASN	10070	11258	11618	12115	Driskell 1996:320
Dust Cave, AL	DASN	10310	11226	12237	12919	Driskell 1996:320
Dust Cave, AL	DASN	10330	11579	12224	12831	Driskell 1996:320
Dust Cave, AL	DASN	10340	11574	12218	12844	Driskell 1996:320
Dust Cave, AL	DASN	10345	11760	12215	12813	Driskell 1996:320
Dust Cave, AL	DASN	10390	11776	12332	12837	Driskell 1996:320
Dust Cave, AL	DASN	10450	11954	12498	12854	Driskell 1996:320
Dust Cave, AL	DASN	10470	11958	12487	12886	Driskell 1996:320
Dust Cave, AL	DASN	10480	11962	12482	12896	Driskell 1996:320
Dust Cave, AL	DASN	10490	11186	12477	13166	Driskell 1996:320
Baucom, NC	DASN	11100	9005	13132	17006	Peck and Painter 1984:37;Goodyear 1999
Dust Cave, AL	SN	9190	9983	10321	10690	Driskell 1996:320
Dust Cave, AL	SN	9720	10789	11169	11230	Driskell 1996:320
Dust Cave, AL	SN	9890	11175	11232	11552	Driskell 1996:320
Dust Cave, AL	SN	9990	11167	11393	12283	Driskell 1996:320
Page-Ladson, FL	SN	9450	10413	10646	11156	Dunbar et al. 1988:449, 1989:477-482
Page-Ladson, FL	SN	9730	10696	11171	11338	Dunbar et al. 1988:449, 1989:477-482
Page-Ladson, FL	SN	10000	11180	11400	12256	Dunbar et al. 1988:449, 1989:477-482
Page-Ladson, FL	SN	10280	11442	12011	12797	Dunbar et al. 1988:449, 1989:477-482
St. Albans, WV	SN	9900	9924	11253	12964	Broyles 1966:27, 40-41
Phinizy Swamp, GA	SN	8953	9912	10166	10219	Elliott et al. 1992
Big Eddy, MO	SN	10185	11358	11811	12347	Hajic et al. 2000:31; Lopinot et al., eds., 1998:91-93, 2000

Table 1.2. Continued

Site	Culture	14-C date	Minimum Calibrated Date	Intercept ₅	Maximum Calibrated date	Original References
Johnson, TN	CN	8940	9634	10154	10357	Broster and Norton 1996:292-294
Puckett, TN	CN	8490	9029	9509	10107	Norton and Broster 1992:35, 1993
Puckett, TN	CN	8820	9488	9891	10360	Norton and Broster 1992:35, 1993
Thunderbird, VA	CN	9900	10291	11253	12808	Gardner 1974:5
St. Albans, WV	CN	8800	9033	9846	10687	Morse 1997
St. Albans, WV	CN	8850	9133	10091	10734	Morse 1997
St. Albans, WV	CN	8930	9547	10152	10475	Broyles 1966:27, 40-41
Patrick, TN	CN	9410	9894	10610	11543	Chapman 1976:3-4
Ice House Bottom, TN	CN	8525	8593	9528	10466	Chapman 1976:3-4
Ice House Bottom, TN	CN	8715	9473	9637	10190	Chapman 1976:3-4
Ice House Bottom, TN	CN	9175	9604	10324	11156	Chapman 1976:3-4
Ice House Bottom, TN	CN	9350	9977	10559	11196	Chapman 1976:3-4
Ice House Bottom, TN	CN	9435	9922	10652	11338	Chapman 1976:3-4
Rose Island, TN	CN	8060	8173	9007	9816	Chapman 1976:3-4
Rose Island, TN	CN	9110	9873	10236	10668	Chapman 1976:3-4
Rose Island, TN	CN	9330	9894	10517	11204	Chapman 1976:3-4
G. S. Lewis West, SC	CN	6950	7009	7775	8539	Anderson et al., eds., 1992:16; Anderson and Sassaman 1996b:231
Rae's Creek, GA	CN	7570	8057	8382	8597	Crook 1992: 126
Rae's Creek, GA	CN	8370	8592	9428	10153	Crook 1992: 126
Rae's Creek, GA	CN	9060	9895	10218	10492	Crook 1992:124, 126
Hester, MS	CN	6140	6064	7004	7786	Brookes 1979:127-128
Hester, MS	CN	6965	7481	7770	8165	Brookes 1979:127-128
Hester, MS	CN	8335	8455	9354	10160	Brookes 1979:127-128
St. Albans, WV	Bl	8160	8778	9086	9466	Broyles 1966:27, 40-41
St. Albans, WV	Bl	8250	9006	9167	9489	Broyles 1966:27, 40-41
St. Albans, WV	Bl	8820	8594	9891	11202	Broyles 1966:27, 40-41
St. Albans, WV	Bl	8830	8196	9897	11951	Broyles 1966:27, 40-41
Rose Island, TN	Bl	8800	9157	9846	10558	Chapman 1976:3-4
Rose Island, TN	Bl	8700	9015	9662	10500	Chapman 1976:3-4
Rose Island, TN	Bl	8660	9285	9593	10210	Chapman 1976:3-4
Rose Island, TN	Bl	8920	9162	9986	11064	Chapman 1976:3-4

Table 1.2. Continued

Site	Culture	14-C date	Minimum Calibrated Date	Intercept 5	Maximum Calibrated date	Original References
Dust Cave, AL	ES	8330	8812	9355	9599	Driskell 1996:320
Dust Cave, AL	ES	8450	9158	9486	9551	Driskell 1996:320
Dust Cave, AL	ES	8470	9330	9490	9538	Driskell 1996:320
Dust Cave, AL	ES	8720	9531	9694	10150	Driskell 1996:320

Note: (PCL=Pre-Clovis, CL=Clovis, DA=Dalton, DASN=Dalton/Side-Notched, SN=Side-Notched, CN=Corner-Notched, BI=Bifurcate, ES=Early Stemmed).

Radiocarbon dates are given without error, and maximum, minimum and Intercept 5 calibrated dates are given as indication of error range of date. Carbon dates are in radiocarbon years before present (1950). Calibrated dates are in calendric years before 1950.

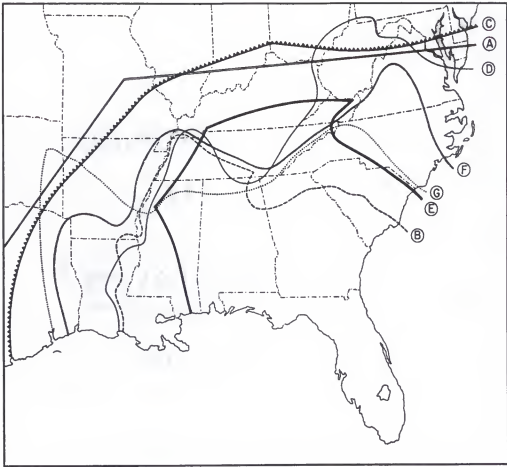


Figure 1.1. Definitions of the Southeast Cultural Area (adapted from B. Smith 1986). A) Wissler 1922, Figure 61; B) Kroeber 1939; C) Swanton 1946:23; D) Murdock 1960; E) Willey 1966; F) Jennings 1974; G) Stoltman and Barreis 1983.

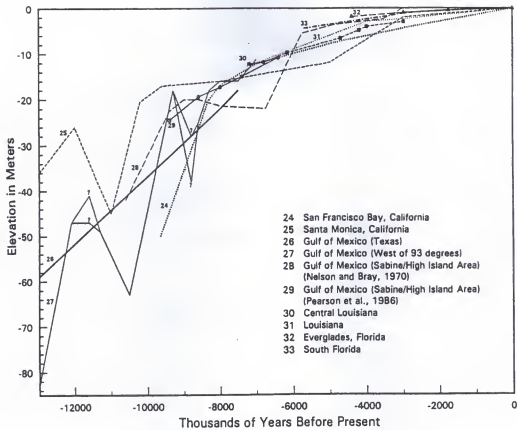


Figure 1.2. Sea level curves for the Gulf of Mexico (Stright 1995:Figure 7)

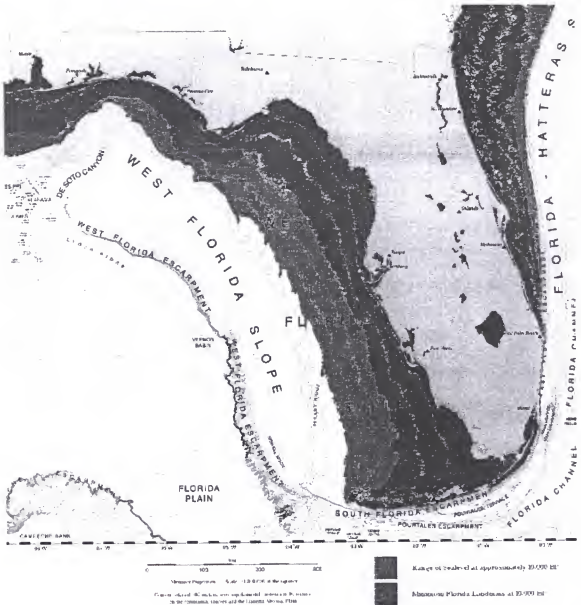


Figure 1.3. Probability map of the Florida coast at 10,000 BP showing maximum and minimum extents based on sealevel curves

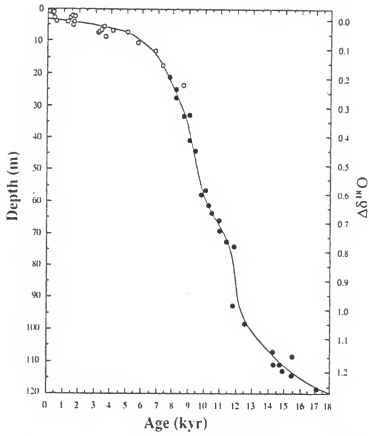


Figure 1.4. Sealevel curve for the Caribbean, based on reef data from Barbados (adapted from Fairbanks 1989)

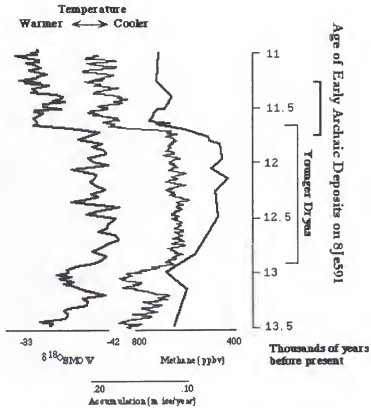


Figure 1.5. Changes in $\delta^{18}\text{O}$ and methane from the GISP2 core as an indicator of the dramatic climate change from the Younger Dryas to the Preboreal period (adapted from Brook et al. 1996)

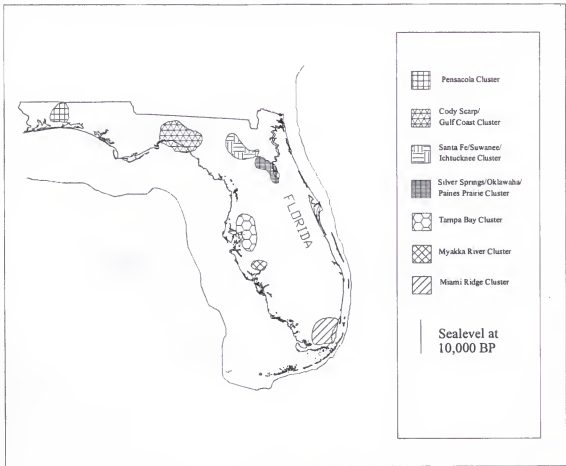


Figure 1.6. Florida initial and early Holocene site clusters

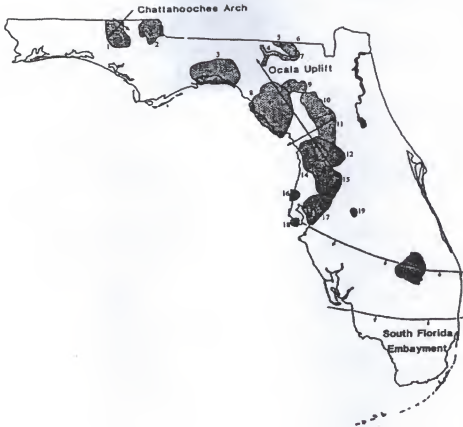


Figure 1.7. Florida chert quarry clusters (compiled from Upchurch *et al.* 1982). Key: 1- Wright Creek; 2-Marianna; 3-Wacissa; 4-Upper Suwannee; 5-Alapaha River; 6-Swift Creek Swamp; 7-White Springs; 8-Lower Suwannee; 9-Santa Fe; 10-Gainesville; 11-Ocala; 12-Lake Panasoffkee; 13-Inverness; 14-Brooksville; 15-Upper Withlacoochee; 16-Caladesi; 17-Hillsborough River; 18-Turtlecraw Point; 19-Peace River

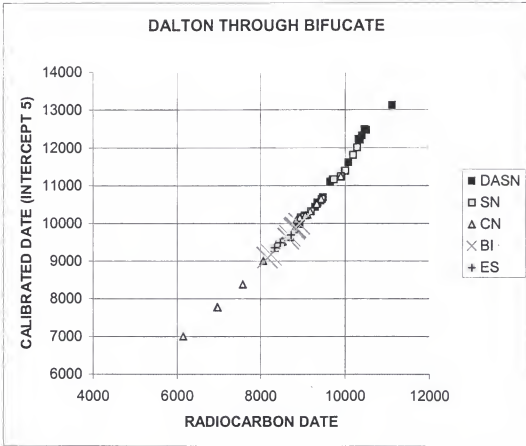


Figure 1.8. Temporal spread of projectile point styles based on dated specimens from the Southeast (based on data from Anderson 2002). Note substantial overlap between Dalton/Early Side Notched and Side-Notched points. Also, note longevity of corner-notching tradition (DASN=Dalton/Side Notched, SN=Side Notched, CN=Corner Notched, BI=Bifurcate, ES=Early Stemmed).

CHAPTER 2

EARLY HOLOCENE EXCAVATIONS AT PAGE/LADSON (8JE591)

Presenting a summary of excavations on the Page/Ladson site's initial and early Holocene components is critical to understanding the excavators' conclusions about the site. The chronological, narrative form of this presentation is intended to convey the sequence of excavations and the related working hypotheses used to direct successive seasons. Field data often changed the course of subsequent excavations, a phenomenon that is conveyed most easily in narrative form. The principal goal of this chapter is to provide a written record of sequence of fieldwork conducted between 1987 and 1997 on Page/Ladson's early Holocene components. Research prior to 1987 is also included as background.

An important part of the Aucilla River Prehistory Project has been incorporating volunteer divers and field technicians into the archaeological work. A small part of the narrative will detail the expertise that some of these volunteers have brought to the project. Many of the volunteers have joined for several years, then gone on to other projects and pursuits. Some have gone on to other projects only to return after several years absence. There are also many who consider the project one of the highlights of their year and whose participation is ongoing and active.

Excavation on the Half-Mile Rise section of the Aucilla has been sporadically attempted from the late 1960s. Early work was pursued by amateur diver/collectors with an interest in Florida's late Pleistocene megafauna. Roger Alexson, Ben Waller, Dr. Richard (Dick) Ohmes, Wayne Grisset, and Don Serbosek were all among the divers to

collect Native American artifacts and megafauna from the bottom of this part of the Aucilla River. Professional paleontologists also recognized the importance of the site in the late 1960s (Webb 1976). Don Serbosek (1983) has the distinction of being the only amateur to excavate a nearly-complete mastodon skeleton from Half-Mile Rise and write about the experience in some detail. In addition to megafaunal remains, he recovered a number of diagnostic projectile points and tools from the same deposits.

Serbosek's discoveries spurred renewed interest at the Florida Museum of Natural History (FLMNH)---then known as the Florida State Museum (FSM)---and the Bureau of Archaeological Research (BAR) to begin systematic survey of Half-Mile Rise. The original goal of excavations was to identify sites that could provide more detailed information about interactions between the earliest Floridians and Pleistocene megafauna. S. David Webb (FLMNH) and James Dunbar (BAR) organized and led early scientific survey and excavation in the Aucilla during the early 1980's. This work has been summarized by Dunbar (1996, 2002) and will be briefly reported here.

The principal goal of initial survey work was to find a site with intact strata that held the prospect of yielding *in situ* artifacts and related megafaunal material. Webb (1974) had suggested that game in eastern North America had used of karst features as access points to water---an especially important resource in a more arid, late Pleistocene Florida (Delcourt and Delcourt 1984). The entire length of Half-Mile Rise was bathymetrically mapped (Figure 2.1), with special emphasis on deep holes that might represent sinks---or springs---in the Late Pleistocene. The assumption was that at least some of these deep sinks would have been open during the latest Pleistocene, providing permanent access to even the deepest aquifer water, a critical element of dry season

survival in a relatively over-drained, arid environment (Watts 1980). In all, investigators plotted seven karst features greater than 8m deep in the Half-Mile Rise section (James Dunbar 1999, personal communication).

Mapping began on November 14, 1983 and was followed by more detailed bottom evaluation and hand-fanning the deeper holes (8Ta120, 8Je122, 8Je608, Aucilla 3E, 8Je591[a.k.a. Aucilla 3J]). The density of remains in the central portion of the Page/Ladson site (8Je591) combined with the sizeable collection of B.F. Page from the same site convinced Webb and Dunbar to pursue it as their primary site (Dunbar 1996).

The next two field seasons (1984-1985) were dedicated to defining, testing, and mapping the Page/Ladson site. The research focus on megafauna/man interactions was unchanged. A small test excavation (Test A) was placed on the east side of Page/Ladson (see Figure 3.1). Test A's shallow sediments appeared heavily-reworked and not conducive to finding in situ materials. Moving downstream about 15m, the crew excavated a single 3m square test (Test B) in natural levels in the center of the river---just east of a large, deep sinkhole feature in the river bottom (Figure 2.1). Excavators recovered several bone tools and side-notched points from organic-rich deposits dating to around 10,000 years BP. This was the first indication that there might be undisturbed Late Paleoindian/Early Archaic materials on the site as well as Early to Middle Paleoindian remains (Dunbar 1996).

Additionally, the field crew noticed there was a dramatic difference between sediments close to the river bottom and those more deeply buried. The upper levels tended to be unconsolidated and largely composed of organic debris while levels at and below a level that yielded Deptford pottery were highly consolidated and largely

sequentially deposited---as indicated by radiocarbon assays. This raised the possibility that much of the submerged site older than 4,000 BP had not been reworked by the river. Radiocarbon assays from Test B (Table 3.1) also gave some remarkably old dates for side-notched style points and related tools. Unfortunately, the team could not identify any features in Test B, despite digging into fully Pleistocene strata.

Part of the crew on a surface-collecting dive closer the western bank encountered a bone that changed the direction of study for the 1987 excavation season. When they lifted it from the bottom, it was stained on one end and tannish-brown on the other. Substantial experience with bones from tannic river contexts indicated that the bone was newly exposed to the river, with at least part (the light end) remaining in in-place deposits. These in situ deposits were the target of the next test (Test C). Early in the excavation of Test C divers encountered what appeared to be a buried paleosol with a range of artifacts and other materials scattered on its top and within the layer itself. Among those remains were side-notched points traditionally associated with Late Paleoindian/Early Archaic populations (Milanich 1994:52-58). The 1987 season closed by excavating Test C to below the newly-discovered level by a meter and driving a 7.5cm-diameter core 2.6m below the bottom of the excavated floor (Dunbar 1996).

As part of the effort to open the 2m X 3m Test C, it became clear that the deposits below the Deptford horizon straddled the most dramatic part (Jacobsen and Grimm 1988) of the Pleistocene/Holocene transition (approx. 10,500 to 9,800 BP). This convinced most of the team that at least one more season should be spent attempting to expose larger horizontal areas down to Pleistocene levels.

The following year (1988) had two principal objectives. The first was to further expand Test C, opening 1m X 3m extensions to the north and south of the original test. The second objective was to examine the stratigraphy of the surrounding area through strategically-placed cores. Excavations extending Test C to the north and south proceeded through what came to be called colloquially the "Bolen dirt," after the style of point (Bullen 1975) recovered from just above, on, and in the putative paleosol.

Artifacts on and in the "paleosol" were mapped in situ and recovered. However, many of the wood pieces and limestone and dolomite cobbles on the paleosol's surface were not recorded, as they were not initially viewed as potential artifacts. A subset of the cobbles was mapped, but not bagged separately. The mapping technique is described in two publications (Dunbar et al. 1988, Dunbar 1996).

Coring work revealed more of the overall strata of the sinkhole. On the east side of the active river channel, the limestone basement rock is largely exposed. Redeposited sediments that are annually reworked by flooding events characterize the central part of the channel. These annually-reworked materials consist of leaf matter, twigs, sand, clay, small branches, and limited amounts of modern debris. Upstream (north and east) of Test C undisturbed sediments thinned dramatically, reflecting what has been interpreted as Holocene sediment stripping and higher basement rock elevations. The area 20m-40m upstream is well-scoured by the constant influx of water from the Wacissa River over a dolomite shelf.

Downstream of Test C, the sediments appear to get substantially thicker. Test B is located in these sediments. To the west of Test C, organic-rich sediments thicken until they break the modern average river level. Post-Deptford sediments (3500 BP to present)

all appear to be organic-rich, consolidated muds or degraded peats that form a massive, semi-submerged bank. The terrestrial portion of this bank is the dive station for operations in Test C and adjoining tests (Figure 3.1). This bank has not been cored. The 1988 season concluded with substantial quantities of new data on the Pleistocene/Holocene levels as well as finds and carbon dates from the pre-11,000 levels (Dunbar 1996).

Excavations on the upper levels at Page/Ladson resumed in the fall of 1992. The research design for the two week season was dedicated to additional work on the upper levels, including work on two one-meter square tests (G and H) to the west of Test C/Test C north extension (see Figures 3.1, 3.2). Again, wood remains and non-chert rock were mapped, but not saved. All bones, chert pieces, and clearly worked rocks were mapped and saved. The larger goal for the season was to systematically sample a "stairway" of sediments (Test F) extending eastward into the center of the Aucilla. These samples, taken at 20cm intervals, would document on-site deposition from 10,000 BP to around 13,000 BP (Dunbar 1996, Quitmyer 1992).

Tests G and H were successfully excavated to just below the paleosol during the first two weeks of the 1992 season. Significant finds included a continued scatter of wooden, bone, and rock debris. In the central part of Test G, a two centimeter diameter wooden stake was found driven into the paleosol. This vertical stake was photographed in situ (Figure 3.), the area surrounding it was excavated and a 45cm section was removed from the sediments and subsequently carbon-dated (see Table 3.1).

During the excavation of Test H, we encountered a cypress (*Taxodium* sp.) log approximately 50cm in diameter in the gray clay layers overlying the paleosol. This log

extended into the southern profile of Test H. At first, the log appeared suspiciously like the end of what Newsom and Purdy (1990) characterize as a Type I canoe. The relatively-eroded northern end of the log impeded the excavation of underlying levels, so it was carefully cut with a handsaw at the south profile wall of Test H, bagged, photographed, and subsequently drawn. A small sample of this log was carbon-dated (Table 3.1) by the bulk method.

At the end of the 1992 season, it was not clear whether the wooden object was a log or the end of a canoe, so plans were made to return and excavate the remainder of the wooden object to the south. Previous work indicated that the sediment overlying and adjacent to the "canoe-like" log were completely devoid of primary deposits of artifacts or features. These water-lain clays held isolated examples of reduction flakes and an occasional bone pin, but were largely free of archaeological materials until within 10cm of the paleosol. On this basis, in 1995 we returned to the site for a series of excavations. Activities included uncovering the "canoe-like" log, excavating several land tests on either side of the river, a controlled sampling of the sediments above and below the paleosol, and a more detailed documentation of the 2m x 3m area adjoining the Test C south extension.

A three week field season (May 1-22, 1995) consisting of two weeks of underwater work uncovering the "canoe-like" log followed by a week of excavating tests around the Page/Ladson sink. The single objective for the underwater work was to determine whether the "canoe-like" log was an artifact or simply a fallen cypress tree. As the object was uncovered, it became clear that it was a fallen cypress tree. Although the end was not ultimately uncovered during this season---in that it is buried by greater than three

meters of sediment where it disappears into the new south profile, but its rounded, unburned shape and a lateral stress fracture near the south profile suggest a fallen tree.

Once we determined that this object was a naturally-occurring log, a cross-section was removed from the largest diameter area and forwarded to David Stahle at the University of Arkansas. He and his colleagues (Anderson et al. 1995) are establishing bald cypress tree-ring chronologies for the Southeast and applying them to archaeological problems. Interestingly, as the field team uncovered the southernmost end of the log, the large number of shells and charcoal recovered from slightly below the log indicated that it rested on the paleosol. Work near this interface was terminated immediately, as we were not in a position to perform detailed point-plotting at the time.

Land work began on the land tests on May 16, 1995. The research design (Carter 1995) is summarized here. The principal question was whether in situ Late Pleistocene/Early Holocene terrestrial deposits existed on either side of the underwater site. Secondary questions included whether these deposits were largely undisturbed and if there was a change in artifact density away from the modern bank. To address this question, .5m x 1m tests were placed on each side of the bank on transects perpendicular to the bank. Two tests were randomly placed within a 20m corridor along the bank on each side of the river. Another two were located in a 30m corridor adjacent to the initial 20m corridor (Figure 3.1). After the initial transect was positioned, other transects were located randomly within 30m wide corridors beginning 15m away from either side of the initial transect.

Each rectangular test was judgmentally oriented in order to avoid large rocks and trees. Each test was excavated either to limestone bedrock or to the top of pre-Late

Pleistocene clay terrace deposits. In one test (AW2), we excavated through the clay deposits to the limestone bedrock. No artifacts were encountered in the clay. It should be noted that Calvin Jones (1988) did locate several Paleoindian artifacts in the upper levels of the clays on the east side of the river during his brief land excavations in 1988, although those excavations have not been widely reported. Aucilla River Prehistory Project staff found initial and early Holocene artifacts in tests BW2 and AE2. They were buried 35cmbs in the former and 80cmbs in the latter. Appendix D summarizes land excavations.

Part of the 1995 plan was to establish a set of monuments on the land portion of the site to serve as horizontal datum references for future work. These are labeled "ARPP DATUM 1" through "ARPP DATUM 4" and are located on both sides of the river, as indicated in Figure 3.1. They are gray 3-inch diameter PVC pipes filled with concrete into which we set a 20 penny galvanized steel spike---head up---and a stainless steel tag. The monuments range from .85m to 1m in length. The monuments' heads are buried to ground-level.

One of the principal weaknesses of work on the Page/Ladson site specifically, and the overall project more generally, was the emphasis---prior to 1995---on locating only remains of Clovis and other lanceolate point-manufacturing peoples. This meant that there were substantial gaps in our understanding of the post-Pleistocene underwater deposits. To partially correct this lack of understanding, ARPP staff set up a sampling excavation for September, 1995. The objective was to systematically sample the exposed west and north profiles of Tests G and H and recover sediments straddling the paleosol. These samples were directed towards understanding the environmental transitions

occurring between approximately 10,300 BP and 8,000 BP. One set of samples was collected for general soil analysis (grain size, total carbon, phosphorus), another set---in the form of blocks---was analyzed for soil structure and pedology, another for palynological work, and one held in reserve for either replacement samples or carbon-dating. Results are summarized in Chapter 3.

Excavation of the 2m x 3m test adjacent of Test C south extension was planned for October, 1995, in coordination with excavation of an additional portion of the Early Paleoindian levels in Test C. The former was completed from October 1 to October 15, 1995. Objects encountered on or near the surface of the paleosol were mapped and labeled in place, and recovered so that their original point proveniences were recorded. In addition to mapping finds, a video record of each one meter square test was taken using Hi-8mm video, although the results of the filming were less than satisfying. Stone, bone, and chert objects from all field seasons have been curated in the Florida Museum of Natural History. Wooden artifacts and fragments are undergoing conservation at The Florida State University and the Florida Bureau of Archaeological Research Conservation Lab. Once the wooden objects are stabilized to a museum environment, they will be curated at the Florida Museum of Natural History.

In June 1997, a team of Conservation and Recreational Lands (CARL) archaeologists (Chris Neumann, Ryan Wheeler, and Melissa Memory) visited the site and provided the project with differential Global Positioning System (GPS) coordinates for several of the datum points set up on the Page/Ladson site. Finally, a detailed, topographically-correct base map of the Page/Ladson site (Figure 3.1) was generated onto which all the previously-excavated tests were plotted. Excavations of Late Pleistocene

deposits on Page/Ladson are documented elsewhere (Dunbar 1996) and should be consulted for a complete understanding of site excavations. There are no current plans to excavate more of the site.

CHAPTER 3

UNDERWATER EXCAVATIONS AND ANALYSIS OF SUBMERGED DEPOSITS AND THEIR CONTENTS

This chapter assembles and analyzes data by naturally-related test units collected during field seasons between 1984 and 1995, as part of the Aucilla River Prehistory Project. Soils, carbon dates, fauna, flora, and artifacts are described and analyzed below. Horizontal distributions of artifacts, test unit profiles, artifact drawings and photos, and feature descriptions are presented to support the assertion that the paleosol uncovered in Test C and adjacent tests is part of a rockshelter site occupied for a limited time prior to 10,000 rcbp and abandoned either soon before, or during a flooding event on the Younger Dryas/Preboreal boundary. Artifacts and dates from Test B verify the presence of a large site nearby. Although the activities carried out at the site can not be described fully, the presence of hearths, finished points, scrapers, ground-stone tools and tool preforms, and vertical stakes suggest that there were minimally butchering, meat-smoking, and stone tool manufacturing activities occurring on the site, and that the site was occupied, at least temporarily, in the earliest Holocene.

Chronological Considerations

One of the most important parts of excavating in-place early Holocene deposits in an underwater setting is the possibility of more firmly dating early Holocene diagnostic points. The relatively good preservation of organic materials on underwater sites (Purdy 1991:1-5) provides the opportunity to recover samples that can be radiocarbon dated. Radiocarbon dates have been run on early Holocene strata at Page/Ladson (Table 3.1).

These dates firmly place the side-notched and corner-notched projectile points—variously typed as Bolen, Kirk, Palmer, and Big Sandy—in the period between approximately 10,300 BP and 9,000 BP. This set of dates conforms well to similar dates run on deposits yielding Dalton and side-notched projectile points from Dust Cave in northern Alabama (Anderson 2002; Driskell 1994). Moreover, the presence of a diverse set of other lithic and bone tools suggests that projectile points are not the only potential index artifacts for the early Holocene.

Early Holocene Levels in Test B

Test B is a 9m² test excavation located in the middle of the Aucilla River (Figure 3.1). This test was excavated to a depth of approximately 3m in two field seasons (1984–1985). Limited formal analysis has been done of early Holocene soils in Test B (Dunbar et al. 1988). Detailed notes were taken in the field, profile drawings are available for the (Figure 3.2), and a summary of the strata has been presented (Dunbar et al. 1988). Prior to 10,000 rcybp, organic-rich marls are the predominate sediment deposited in this area. Peats appear to begin accumulating around 9,700 BP and continue until at least 9,400 BP, at which point a long depositional/erosional cycle was established---temporarily interrupted only by a brief, purely-depositional episode during the Deptford period where sherds from an adjacent Deptford terrestrial site. The depositional/erosional cycle continues today. Levels 7 through 11 correspond to the early Holocene and are the primary deposits from which diagnostic early Holocene period artifacts were recovered (Table 3.2). The deposition of peat in this area suggests that a nominally still-water---at least partially-aerated---pond environment existed on the site. Enough water has been continuously available at the site since the Early Holocene to preserve relatively large tree limbs and much more fragile leaves.

Artifacts and Artifact Distributions from Test B

Two temporally-diagnostic tools were recovered from pre-9,500 rcypb levels in Test B (Figure 3.3): one Bolen Plain projectile point and one Bolen Beveled projectile point. Additionally, an Aucilla adze (Figure 3.4) was recovered from Zone C, Level 8. Other artifacts recovered from the early Holocene levels include an utilized flake (Figure 3.5), a pair of antler flakers (Figures 3.6 and 3.7) (Dunbar et al. 1989), and an antler tool of undetermined use (Figure 3.6) (see list of potential uses in Chapter 6). Additionally, a ground stone implement (Figure 3.7) was recovered from Level 12, below diagnostic early Holocene material. This ground stone tool probably is similar to artifacts recovered from early Holocene levels in Test C (see below), although both Simpson (1948) and Neill (1971)---and see the observation of Agogino (1962)---suggest that these ground stone tools are associated with Paleoindian lanceolate points and date at least to the Middle Paleoindian period (*sensu* Anderson 2002). No archaeological features or other observable horizontal patterning of the artifacts was recorded from Test B. A summary of early Holocene artifacts recovered from Test B is presented in Table 3.3.

Early Holocene Levels in Test C and Adjoining Test Units

Between 1987 and 1995, Aucilla River Prehistory Project personnel excavated a total of 21m² of what was called originally the “Bolen Dirt” in the Test C area. Work began with Test C (6m²) and proceeded through Test C/North and South extensions (6m²), then Tests G and H (2m²), and concluded during the 1995 season with Tests O, P, Q, T, U, V, and I (7m²). During the first season of work on this stratum, artifacts and concentrations of wood and rock from the Strata 5/6 boundary suggested there might have been a human occupation on or near Test C during the Pleistocene/Holocene transition.

Items documented on that surface were mapped in situ (Figure 3.10) and recovered after mapping, either aggregated by test unit or as point-provenienced items. The horizontal distributions of items were drawn on 1m x 1m sand-blasted rigid plastic suitable for underwater use, then transferred to graph paper at 1:5 or 1:10 scale on the surface immediately after each dive. Recovered materials included stone, bone, and wood artifacts, and unmodified rock, bone, and wood. Items were bagged underwater either by test, or by point provenience number for individual items or item groups. A catalog of items recovered from the test units was compiled for this study (Appendix B) from data collected by James Dunbar (1984-1988 field seasons) and the author (1992-1995 field seasons).

Soils

Kendrick (2000) has provided a comprehensive evaluation and correlation of sediments from the Test C area of Page/Ladson. Kendrick's evaluation supercedes previous field-designated strata. In the present study, artifact proveniences have been correlated and translated into Kendrick's strata, though only those correlated to Kendrick's Strata 4, 5, and 6 (Table 3.4), which bracket the initial and early Holocene periods, are dealt with here. Kendrick's and my personal observations are summarized below (Table 3.5), along with important environmental implications. The south profile of Tests T, U, and V (Figure 3.11) was recorded during the 1995 field season. The profile covers Kendrick's Strata 5 through 7.

Two important observations have a bearing on the artifacts from Strata 5 and 6. First, the calcareous, largely anaerobic encapsulating sediments (Stratum 6) provided an environment that preserved even the most delicate organic materials. Bone artifacts recovered from these sediments were light tan when first uncovered, macroscopically

appearing as if they had just been discarded. Within minutes of being uncovered, the bone would visually darken, presumably taking up dissolved oxygen and tannins from the surrounding water. Other types of organics underwent the same type of change, including the fine twigs and leaves encased in Stratum 6. The presence of high levels of either precipitated or crushed limestone sand and pebbles suggests long dry periods interrupted by brief wet periods (Dunbar et al. 1989). Second, a combination of independent observations from the Strata 5/6 boundary (Table 3.4) suggests that the period Stratum 5 represents was relatively dry, dry enough to desiccate the soil at least intermittently. This period was followed by a rapid inundation and near-constant inundation to date.

In addition to Kendrick's (2000) characterization of the overall stratigraphic profile, Scudder (1999) has focused on the origin and deposition of Strata 4, 5, and 6. Scudder's analysis included particle size, clay identification, invertebrate faunal identification, and a standard suite of total pH, carbon, nitrogen, phosphorus, iron, and aluminium analyses. On the basis of the observation of intact small bivalves and gastropods, a relatively low total phosphorus level, and the lack of observable pedogenic levels, she concluded that Stratum 5 was not the result of human occupation. She does, however, suggest that the artifacts found on the site may be the result of discard behavior from adjacent upland sites, or the result of artifacts being colluvially deposited from an adjacent upland site.

Several field observations suggest that there is likely a more complex depositional history to Strata 4-6 than suggested by Scudder. First, Stratum 4 is water-deposited and shows no signs of pedogenesis and little or no compaction. By contrast, Stratum 5 is

compacted macroscopically and much more difficult to disarticulate physically. Moreover, it is highly resistant to disarticulation with deflocculants (e.g., sodium sesquicarbonate). Wood on the surface of Stratum 5 is also dessicated and the unit has vertical fissures, both suggesting that the sediment and wood deposited on the Strata 5/6 interface underwent at least one long drying event. Finally, Stratum 6, with heavy initial deposits of aquatic gastropods, sand, wood, flint, ground stone tools, and limestone, suggests---in accordance with Scudder's (1999) conclusion---colluvial deposition, possibly through site flooding. Diagnostic points, unoxidized bone, and dates from the initial 10cm of Stratum 6 suggest that the site was reoccupied concurrently with this flooding event. The total pH of Stratum 6 is also relatively basic (7 to 8), explaining both the relatively poor pollen preservation noted by Hansen (1999, see below) and the good bone preservation.

As part of the research related to the Early Holocene depositional environment, S. David Webb, Mark Muniz, and the author visited an upland intermittent karstic stream near Gainesville, Florida, called Blue Creek, in 1995. This natural area has deeply eroded karst ravines, stream beds with limestone banks, and vertical relief of as much as 11m. A deep, humic mat covers the ravine bottom and the small creek flows in the middle of the ravine, disappearing into underground stream courses after flowing on the surface for several miles. Under high rainfall conditions, the ravine partially floods, inundating the ravine-bottom soils. This modern homologous environment documents the formation of organic, pedogenic soils on karstic ravine bottoms and confirms that in karst environments these type of intermittent streams can develop under the appropriate geological and hydrological conditions.

Radiocarbon dates

Page/Ladson is only the second archeological site in Florida to yield diagnostic early Holocene projectile points---Palmer side-notched and Kirk corner-notched---in direct association with radiocarbon dates (Table 3.1). These dates have been compared to each other, and to dates from 8Le2105, and have been found to be statistically related (Faught et al. 2003), with the exception of one date (8905 ± 65 BP [AA-007454]) that was likely too young due to storage prior to dating. The sample was likely contaminated with modern algae. Of all the dates, the hickory nut (9950 ± 70 BP [Beta-103888]) and the sample from a cypress log exterior (9930 ± 60 BP [Beta-058858]) are probably the best for dating the boundary between Strata 5 and 6, the hickory nut because it was whole, undegraded, and an annual growth, the cypress because it came from the exterior surface of a whole tree, thereby approximately dating the tree's death and deposition 10cm above the Stratum 5/6 interface.

The wood samples (Table 3.1) embedded in the Stratum 5/6 interface could have been from interior sections of trees, giving older dates than the deposition layer, although one has precisely the same date as one of the vertical stakes. If this is the case, the stake and the wood dating to the same age were likely embedded prior to Stratum 5 being inundated. Interestingly, the date from below the diagnostic Kirk Corner-notched point recovered from Stratum 6 dated older ($10,300 \pm 120$ BP [Beta-103889]) than dates on organics from the Stratum 5/6 boundary, suggesting that the date, taken on a bulk soil sample, either had a small amount of residual "dead-carbon" in the sample, or that the organics in the sample were fixed during the Younger Dryas, which is known to have been a radiocarbon plateau that yields radiocarbon dates with large error ranges (Clark et al. 2001; Fiedel 1999).

Radiocarbon dates from Test C and adjacent units suggest two dramatic climatic shifts in the Aucilla River drainage occurred between 10,200 and 9,950 rcybp, the first marking the introduction of high volumes of midcontinental ice sheet water into the upper Gulf of Mexico (circa 10,200 rcybp) (Teller 1995), the second matching closely (within 50 years) of the radiocarbon age of the final shift of glacial outwash from the Mississippi to the St. Lawrence (Clark et al. 2001). These dates also correspond well with assays performed on the lower strata from Dust Cave in northern Alabama (Driskell 1994), where dates ranged from 9990

Pollen

As part of the environmental reconstruction of the Page/Ladson site, numerous pollen samples were taken in 1988, 1992, and 1995. The most important for evaluating the paleoclimate circa 10,000 rcybp are those taken in Test G and H in 1995. Analyzed by Hansen (1999), these samples focused on the period between 10,300 rcybp and 9,000 rcybp (Figures 3.12 and 3.13). According to Hansen (1999), the transition marked by the "Bolen Level", or Stratum 5/6 boundary, shows a dramatic increase in *Chenopodiales* (Goose-foot) and other taxa that result from disturbance and/or in upland ecosystems, and a concurrent decrease in floodplain forest and cypress swamp species. Simultaneously there is a sustained increase in charcoal and degraded pollen in the sample, the former likely indicating human activity in the area---especially considering the overall reduction in forest species (Hansen 1999), and the latter indicating a potentially drier climate---likely indicated by a more erosive deposition regime. The increase in degraded pollen in the samples from Stratum 6 may also have resulted from the higher overall pH of the soils, which has been linked to poor pollen preservation (Bryant et al. 1994).

Viewed in regional perspective with nearby Camel Pond and Shellar Lake (Hansen 1999), the Bolen-age levels at Page/Ladson fit into a brief period of overall dry climate—indicated at Camel Pond by an depositional hiatus—followed by a period that was also dry but punctuated by intermittent heavy rains (Figure 3.14). It is also possible that the heightened charcoal levels in the Strata 5 and 6 were the result of anthropogenic factors, including using forest fires as a game-driving and habitat-enhancing techniques for preferred species (e.g., bison, deer and turkey), more extensive use of fire for food processing and storage (e.g., drying and smoking), and using fire to produce watercraft, all occurring in the immediate vicinity of the site. The latter of these seems to be supported by the presence of adzes and adze fragments found in both Tests B and C.

Given the later adoption of chenopods as one of the first horticulturally-adopted plant foods in the central part of the Southeastern US (Smith 1985)—albeit firmly documented to a much later date ($1,975 \pm 55$ BP)—it is important to note there is such a dramatic spike in chenopod pollen around the Page/Ladson site. This suggests there was the potential to harvest the wild variety as a seasonal (probably early fall) food crop. Evidence from the Enterprise Site in southern Alabama (Brooms et al. 1997), indicates that early Holocene populations were already making use of local hickory nut (*Carya* sp.) and oak (*Quercus* sp.) acorn crops. This confirms previous macrobotanical evidence of early Holocene nut harvesting on Dalton sites in Alabama and Missouri (Hester, 1Gr1x1, 1Pi61, and Rodgers Shelter sites [Smith 1986:Table 1.1]). Several hickory nut and oak acorn fragments were also recovered from the Stratum 5/6 boundary (Appendix B) on Page/Ladson. One hickory nut was used for carbon dating the boundary layer; another has been stored in distilled water since excavation.

Faunal analysis

Peres (1997, Peres and Carter 1999) analyzed the faunal material recovered from the surface of Stratum 5 and the first layer of Stratum 6. By applying a scoring criteria to the distribution of faunal remains and the anthropomorphic characteristics of individual faunal remains (e.g., carbonization, cut marks), Perez (1997) was able to conclude that the faunal remains were likely deposited as the result of natural processes. This conclusion does not conflict with the proposed deposition sequence (see below). In fact, it supports the conclusion that the site was rapidly inundated at the onset at approximately 9960 BP, depositing numerous bones from diverse taxa on the interface between Strata 5 and 6. Field observations of bone items from the top of Stratum 5 indicate a small number of obviously human modified items were present. Several stone and bone tools were recovered both from the Stratum 5/6 boundary and into the first 10cm of Stratum 6 (see below), documenting human activity either on the Stratum 5 surface or in the general area.

Features

Two important site features were documented in the Test C area: vertical wooden stakes and a hearth containing partially-carbonized wood. Vertical wooden stakes were documented in both Test C (Figure 3.10) and Test G (Figure 3.15). In both cases, the stakes averaged 2-2.5cm in diameter and were stripped of bark. The stake from Test C was used for radiocarbon dating, while the stake from Test G was partially removed from its find location and also was used for carbon dating. The bottom end of the latter example was not removed from the underlying Stratum 4.

The vertical orientation of these stakes was totally anomalous when compared to other recovered wood, which tended to be layed out horizontally, most commonly on the

boundary between Strata 5 and 6. The horizontal distance between the two vertical stakes (3m) suggests they could part of a larger structure, possibly like that documented at the Vulcan Site in Georgia (Ledbetter et al. 1996:276). The type of structure could have been a bark or hide shelter, fish trap or weir, or a drying or smoking rack. As Dunbar and his colleagues (1988) have pointed out, the wood stakes did not show signs of desiccation, suggesting they were either deposited immediately before---or after---the flooding event, when higher net water levels were permanently established. If the stakes were placed in the surface within one or two years of the flooding event, they would not have degraded enough to show desiccation. In this case, they could be components of a domestic structure, smoking rack, or drying grate. If they were pushed into the bottom after the flooding event, the stakes were most likely fishing related, possibly components of fish traps, weirs, or platforms.

Another intriguing interpretation of the vertical stakes must be considered in light of the recent detailed publication of the Windover site (Doran 2002). At Windover, wooden stakes of similar dimensions were used to anchor burials into a peat-bottomed pond (Dickel 2002). Some of the burials had been disturbed, most likely by alligators (Doran 2002:8-10), the feces of which were preserved in the pond (Doran 2002:287). At Page/Ladson, the vertical stakes may have marked or pinned down burials, as well, with the lack of skeletal remains accounted for by removal of the bodies by alligators.

The hearth was located in Test P and was approximately 50cm in diameter, although not perfectly round, and averaged 8-10cm deep (Figure 3.10). The bottom of the hearth had limited evidence of heat alteration, including a single piece of wood that was charred on the top and uncharred on the bottom. The lack of other signs of fire

alteration (e.g., cracked stone in and around the feature, ash or light-gray staining of surrounding soil) suggests either that the hearth was used as a smudge or smoking pit, or that the archaeological community does not have enough experience with hearths preserved underwater to recognize all their physical properties. Macrobotanical identification and analysis of the wood has not yet been undertaken by the Aucilla River Prehistory Project, so the wood species from in and around the hearth are not known.

Artifact Descriptions and Distributions

The traditional grouping of artifacts into material classes is followed here, beginning with diagnostic projectile points and concluding with worked wood.

Diagnostic Points

A total of six temporally-diagnostic projectile points were found in the Test C area within Strata 5 and 6 (previously unillustrated examples are shown in Figures 3.16-3.19). Their locations and associations are summarized below (Table 3.6). All the points originating from Strata 5 and 6 date typologically to the early Holocene and would be considered Early Archaic (Anderson 2002; Justice 1987:50-67). Arguably the most important aspect of these points is their relatively early average dating (Table 3.1). These dates place side- and corner-notching well within the time range of Dalton assemblages from other parts of the Southeast (Goodyear 1982, 1999). Other sites in the Southeast, including Dust Cave (Driskell 1994), Packard (Wyckoff 1985), and Rodgers Shelter (Kay 1982), have contemporaneous dates on side-notched points. This supports the assertion that notched points were produced concurrently with unfluted lanceolate points (e.g., Plainview, Agate Basin, Suwannee, Simpson), and are contemporaneous with, or potentially earlier than Dalton points (Wyckoff 1985; Don Wyckoff 2002, personal communication).

In Florida, sites that have unfluted lanceolate points, like Harney Flats, Johnson Sand Pit, Darby and Hornsby Spring, and Bolen Bluff, also have side-notched points. In the case of Harney Flats, the side-notched and lanceolate points came from stratigraphically indistinguishable contexts (Daniel and Wiesenbaker 1987), a phenomenon that the excavators explained by suggesting that the site was both exposed for a long period of time and was subject to erosive forces between the nominally non-contemporaneous time periods. However, the date ranges of non-fluted lanceolate points and early side-notched points substantially overlap (see Chapter 1), suggesting that co-occurrences of the two types on a single site may be the result of the use of two different projectile points in a single socio-technical setting, which has been documented ethnographically among the Agta (Griffin 1997) among other groups.

In the case of southeastern North America, it may be a prey-based difference, with lanceolate points (Dalton, Suwanee, Simpson, Hardaway) used on larger game like bison and remnant Pleistocene megafauna and notched points used to hunt and butcher game that was deer-size and smaller. The contemporaneity of individuals making side-notched and Dalton points is suggested by the presence of Dalton adzes on the Jeannie's Better Back site (8Lf54), which only produced side-notched points from its lowest levels. The three Dalton adzes from 8Lf54 were recovered from levels that produced at least six side-notched points (Austin and Mitchell 1999:Appendix A).

Only two sites in Florida have produced side-notched points stratigraphically above and separated from lanceolate points: Silver Springs (Neill 1964, Hemmings 1975) and Wakulla Springs (Jones and Tesar 2000). On the former site, the lanceolate points were identified as Clovis, not Suwanee or Dalton. At Wakulla Springs, the notched point is

not a typed point, but has one notch similar to those executed on Bolen projectile points. Moreover, the lower occupation did not produce diagnostic Clovis or Suwanee points, but a large preform for one of those two types.

Adzes/Scrapers/Bifaces

One complete adze (Figure 3.19) and an assortment of scrapers, biface fragments, and an incomplete preform were recovered from the Stratum 5/6 boundary (Figure 3.20). Additionally, an adze, preform, and biface fragments were recovered from the middle of Stratum 6. Items from Stratum 6 did not come from an anthropogenic soil or have any kind of recognizable spatial clustering. The adzes and adze fragments suggest that the area may have been used over centuries for woodworking. The complete adze from the Stratum 5/6 boundary compares favorably with a preform of the hafted Dalton adze (Morse 1971, 1973). The presence of these assorted bifaces suggests that the area may have been used to "rough-out" bifaces that could then be either transported or converted to finished points or adzes in the immediate area. This core-trimming activity appears to be supported by the large, cortical flakes recovered from the Stratum 5/6 boundary (see below)

Cores and Core Tools

One bifacial core was recovered from early Holocene deposits on Page/Ladson. This core has numerous step fractures on either side of the core. It appears to have been used solely for the removal of flakes and was abandoned prior to being fully exhausted. Two random cores were recovered from the Page/Ladson early Holocene deposits. Both appear to have usewear were recovered from the Test C area excavations (Figure 3.22, lower). There is a remarkable resemblance between one core (Figure 3.22, upper right) and cores described from Dalton sites in Arkansas (Morse 1973: Figure 5-i). These cores

are unlike the bifacial cores used to produce point preforms and bifacial adzes in that they are much thicker, and likely they are used for producing either naturally-backed flakes or *pièces esquillées* (Morse 1971). If this core were used for producing the latter, it would be strong suggestion that bone working was carried out in the immediate vicinity, as *pièces esquillées* have been linked to slotting and grooving bone (Bordes 1968).

Chert Flake Tools and Flakes

Numerous chert flakes and a few flake tools were recovered both from the Stratum 5/6 boundary and from levels fully within Stratum 6 (Appendix B)(see flake tool examples in Figure 3.23). Most flakes were either early stage cortical or non-cortical flakes, both with no retouch. Additionally, most of the flakes do not have the dark-brown river staining that characterizes most of the surface-collected lithics from the bottom of the river. Most of the chert is fine-grained, a light to dark gray with a black oxidized surface, and appears to have excellent fracture properties. Some have the characteristic dark gray weathered rind and fossiliferous coating St. Marks Formation chert. Others are a light to medium gray, characteristic of the Suwannee Formation chert. Both chert types are available in the Wacissa/Aucilla drainage.

Few secondary and no tertiary flakes were recovered directly from the excavated levels or from the screens. This suggests that the principal activity in the area was decortication of larger chert cores and the reduction of those cores into preforms, large flakes, and bifacial cores. Also, the low overall number of flakes suggests that there was not extensive quarrying or lithic reduction activity in the immediate vicinity of the underwater site. However, land excavations on the east side of the Aucilla have yielded large quantities of lithic debris (Chapter 4), suggesting that chertworking was common relatively close by.

A nearby site (8Le2105 [Hornum et al. 1996:188-199]) has features that might explain the lack of secondary and tertiary debitage. On that site, small flakes were systematically gathered and deposited in small pits, suggesting early Holocene knapping went on in a domestic setting where there was concern for stepping on sharp debris (especially likely with infants and toddlers). The lack of this type of debitage in Strata 5 and 6 suggests either this stage of reduction did not occur near the site, or smaller waste flakes were also gathered up at the Page/Ladson site and buried.

Ground Stone Objects, Abraders, Ground Stone Preforms, and Ground Stone Preform Debitage

Three distinctly reworked ground-stone tools were recovered from the Test C area (3.20), all part of the initial and early Holocene bolo stone manufacturing complex (see Figure 5.17). All three stones appear to be discarded portions of bolo stones broken during manufacturing or use. A hypothesized manufacturing process is described in Chapter 5 (below). Other finds of dimpled "bolo stones" suggest that they are found uniquely on Late Pleistocene and initial and early Holocene sites throughout the United States (Agogino 1958; Neill 1958, 1964). These appear to be the only examples found in a well-dated context from the Eastern United States.

Ground stone abraders (Figure 3.21) were also found both on the Stratum 5/6 boundary and into the lowest levels of Stratum 6. Although they vary in shape and size, they all have the characteristic saddling wear and edge-rounding that results from abrading stone, bone, and/or wood. The abraders can be generally grouped into large, hand-sized examples and small, finger-sized examples, possibly a reflection of the two modes of abrading, the former used for larger jobs (mass removal and shaping), the latter for finish sanding and shaping.

Fire-cracked Rock/Dolomite Cobbles

A wide variety of fire-cracked rocks and limestone and dolomite cobbles were recovered from the Test C area. The largest concentration was along the Stratum 5/6 boundary. Muniz (1998) recorded the material, sphericity and angularity, weight, length, volume density, use-wear, and thermal alteration characteristics of individual stones from the Stratum 5/6 boundary. Focused on the relationship between the rocks and the hearth feature, Muniz (1998) examined both non-fire-cracked and fire-cracked rock (FCR) to see if there were significant similarities between the rock by material type or distribution that might yield some behavioral information about the hearth's creators. The thermally-altered subsample had a mean weight 150% of the non-thermally-altered sample (212.8g versus 141.6g), suggesting that the hearth-builders selected larger stones for their hearths (Muniz 1998). Moreover, dolomite dominated the thermally-altered sample, although limestone predominated in the overall sample, suggesting that dolomite was the preferred hearth building stone on the site. The presence of dolomite in the hearth area also suggests there was dolomite working in the immediate vicinity of the site.

Muniz (1998) also examined the distribution of stones around the hearth feature and concluded that it was unlikely that colluvial forces distributed stones from around the hearth because there were many stones to the west and north of the feature, the two directions from which colluvial inputs would come. He suggests that other factors, like kick-scattering or scuffing (Muniz 1998 [citing Stephenson 1991]) may have contributed to the apparently random distribution of stones around the hearth feature. At this site, we were faced with the common equifinality problem. If there are other hearths to the west and north in unexcavated areas, cobbles scattered from these hearths might easily become

mixed with material from the excavated hearth area, obscuring any previously-discernible pattern around it.

Bone tools

One bone tool came from Excavation Unit I, from approximately 10cm above the Stratum 5/6 boundary. The bone pin was bi-pointed, with notable usewear on the non-fractured end (Figure 3.28). It is similar to bone points recovered from other parts of the Aucilla, including Little River Rise (Willis 1988). The bone pin is significant because it bore out what we had suspected about the anoxic nature of the sediments. Additionally, the excellent bone preservation observed on this specimen confirms the buffering qualities of the soil indicated by bulk pH tests and the lack of pollen (Bryant et al. 1994).

Wood Stakes/Branches

A range of twigs, branches, and trunk fragments were recovered from Page/Ladson. Although all were examined closely for signs of human alteration, the only clear evidence was on the two previously-described stakes and on two unit-provenienced wood artifacts from Test C (Figure 3.29 and 3.30). The wood is particularly frustrating because there is no clear criteria for identifying worked wood that does not retain clear chipping or abrading wear, or that has a form that is clearly identifiable as a human-made object (i.e., wood at the Fort Center or Key Marco sites [Purdy 1991:23-53, 82-101]). A whole range of human-used items will likely go unrecognized (e.g., gathered wood, wood staked for a wind-break, and expedient site furniture) if the material is not found in a deposit that puts it in relation to artifacts and features with which the wood can be functionally or ceremonially related (Fort Center [Sears 1982:38-58], Monte Verde [Dillehay and Rosen 1997], Windover [Dickel 2002]).

Although naturally-formed distributions of wood are common in riparian settings (e.g., driftwood piles on sand bar), the distribution of this wood suggests that humans may have played a role in placing the wood on the Stratum 5/6 boundary. Most of the wood from the Stratum 5/6 interface was between 2cm and 10cm in diameter. Larger branches and trunks were rare. Except for the aforementioned examples, none of the wood fragments appeared peeled, chopped, or sanded. However, a substantial portion was charred on one end or on one side.

Depositional History and Overview

The overall sequence of deposition that temporally brackets the artifact-bearing stratum can be reconstructed from the available dates and observations of the strata. Water-lain deposits began accumulating prior to 10,600 rcybp, as indicated from a large oak log recovered from Stratum 4. Towards the end of the Younger Dryas (circa 10,200 rcybp), the top of Stratum 4 desiccated, possibly under the influence of glacial meltwater pouring into the northern Gulf of Mexico. This created the unknown-in-modern-times phenomenon of rapidly rising sea levels and relatively cool coastal water along the Gulf Coast. On a freshly-desiccated ravine bottom in the Aucilla drainage, early Holocene hunter/gatherers established a small camp out of the prevailing westerly winds and near a freshwater source. They moved out to the nearby quarries and knapped bifacial preforms and nutting stone preforms from chert and dolomite, respectively. They also worked wood in the area, and may have collected hickory nuts and oak acorns from nearby sandy uplands.

The desiccation regime ends abruptly sometime between 9,000 and 10,000 rcybp when water-lain sediments again began accumulating on the site, a process that continued at least until the end of the mid-Holocene Hypsithermal (circa 5,000 rcybp), when

renewed erosion of the site diagonally truncated the deposits. Early Holocene bands reoccupied the upland portion of the site and continued depositing debitage, stone tools, and bone artifacts on the site through around 8,900 rcybp. No evidence of Middle Archaic occupation has been documented from the underwater deposits.

On the erosional surface formed at the end of the Hypsithermal, Deptford-period sherds and lithic remains were deposited. In sum, the underwater deposits at Page/Ladson provide a unique and well-dated window into early Holocene foragers and into the Deptford period. Although likely disturbed by post-occupation flooding, the artifacts and features from the *circa* 10,000 BP deposits allow us to expand our knowledge of early Holocene tool assemblages, site location preferences, and tool creation processes (see Chapters 5 and 6 below).

Table 3.1. Radiocarbon dates from early Holocene levels at Page/Ladson

Lab #	FS #	C-14 Age	Test Unit	Sed. Unit ID	Level	Date Type	Material Dated	Comments
Beta-015089	85-59-44	9450±100	B	6	9	RM-U	Wood/ Charcoal	This level between the "Bolen Peat" (Lv. 10 below) and the level producing antler flakers (Lv. 8 above)
Beta-011905	84-527-13	9730±120	B	6	10	RM-U	Peat	Sample taken from recovery locus of Bolen Beveled point. Peat looks like chopped tobacco as in Core 88-2 nearby.
AA-007454	88-60	8905±65	C	6	1a	AMS	Wood/ Charcoal	Wood stake originating in U6 and driven in U5. Date may be young due to 3 year wet storage possible and bacteria. Fraction modern 0.3300±0.0020
Beta-058858	92-26	9930±60	C	6	1a	RM	Wood/ Charcoal	Sample taken from cypress log
Beta-103888	95E-27	9950±70	O	5-6	1a-2b	AMS	Plant Seed	Hickory nut on contact of Unit 5 with Unit 6
Beta-021750	87-09-65	10000±120	C	5-6	1a-2b	RM-U	Wood/ Charcoal	Charred wood in Unit 5 with upper face in Unit 6 (note lv. 1a = lv. 2a & lv. 2b = lv. 3 in 87 notes)
Beta-058857	92-13	10000±80	G	6	1a	AMS	Wood/ Charcoal	Sample of wooden stake originating in Unit 6, Lv. 1a and driven through Unit 5 and Unit 4
Beta-021752	87-09-66	10280±110	C	5	2b	RM-U	Wood/ Charcoal	Desiccated wood in Unit 5 with upper face in Unit 6 (note lv. 1a = lv. 2a & lv. 2b = lv. 3 in 87 notes)
Beta-103889	95E-29	10300±120	U	6	1a	RM	Organic Sediment	Sample from pedestal under Bolen Point taken 5cm to 10cm above Unit 5 contact

Table 3.2. Zones and Levels in Test B (developed from data in Dunbar et al. 1989)

Zone	Level	Soil Type	Artifacts	Beginning Date	Ending Date
A	1-5	Mixed modern	Mixed points, bone tools	3440 BP	Modern
B	6	Mixed peat	Mixed ages	4200 BP	3500 BP
C	7-11	Peats and Marls	Points, flakes, antler tools, scrapers	circa 9,850 BP	circa 9,000 BP
D	12	Gray sandy organic peat	Bolo Stone, debitage	circa 11,900 BP	circa 11,500 BP
E	13-15	Calcareous Clay	None	circa 12,330 BP	circa 11,900 BP

Table 3.3. Early Holocene artifacts from Test B by Dunbar's zone and stratum (condensed from Dunbar, Webb, and Cring 1989 [all Figure references below from Dunbar et al. 1989, unless otherwise noted]).

Zone	Stratum/Level	Count	Name	Material	Reference
A	3a	1	Greenbriar	Chert	Fig. 4C
A	3a	1	Kirk Corner-Notched	Chert	Fig. 4H
B	6	1	Suwannee	Chert	Fig. 4A
B	6	1	Suwannee	Chert	Fig. 4B
B	6	1	Greenbriar	Chert	Fig. 4D
B	6	1	Bolen Side-Notched	Chert	Fig. 4E
B	6	1	Bolen Side-Notched (Beveled)	Chert	Fig. 4F
B	6	1	Bolen Corner-Notched (Beveled)	Chert	Fig. 4G
B	6	1	Wacissa	Chert	Fig. 4I
C	8	1	Aucilla Adze	Chert	Fig. 7A
C	8	2	Antler Flakers	Bone	Fig. 6
C	8	3	Preform Bases	Chert	No Figure
C	8	N/A	Debitage	Chert	No Figure
C	9	1	Utilized Flake	Chert	No Figure
C	10	1	Bolen Corner-Notched (Beveled)	Chert	Fig. 8
C	10	1	Utilized Flake	Chert	Fig. 8
C	11	1	Bolen Plain	Chert	Fig. 9B
C	11	1	Pin	Bone	Fig. 9C
C	11	1	Needle	Bone	Fig. 9D
C	11	1	Utilized Blade	Chert	Fig. 9A
D	12	1	Bolo Stone Fragment	Dolomite	No Figure
D	12	N/A	Debitage	Chert	No Figure

Note: Zone A/B artifacts are dated typologically and Zone C and D by radiocarbon. The Zone E "bolo" stone is included, even though it comes from a level dated $12,330 \pm 110$ B.P. (Beta-15088).

Table 3.4. Technical descriptions of the Late Pleistocene/Early Holocene sediments and stratum boundaries in the Test C area of the Page/Ladson site (8Je591) (developed from Kendrick 2000)

STRATUM	THICKNESS (AVERAGE)	BOUNDARY CHARACTER- ISTIC	TECHNICAL DESCRIPTION
		OPEN WATER	River bottom
7	0.5m-2.0m		Recent river bottom sediments with leaves, twigs, peat, and very fine dark sands
		No distinct sediment	Erosional surface
6b	0.90m-1.90m		Dark gray sandy silt with shell fragments, wood, leaves, and oxidized root filaments
		No distinct sediment	Horizontal wood fragments and oxidized roots
6a	0.10-0.20m		Light gray containing limestone pebbles, gastropod shell, and wood, and penetrated on the top with root filaments
		Sand and silt	Thin veneer of shell-rich silt with sand stringers
5	0.05m-0.25m		Dark brown, sandy, clayey silt containing gastropod shells, fish bones and scales, limestone pebbles, wood, and charcoal
		No distinct sediment	Abrupt, smooth to undulatory contact
4f	0.63m-1.31m		Tan sandy silt containing scattered limestone pebbles, Oligocene echinoids, whole and fragmentary gastropods, insects, fish bone and scales, leaves and wood concentrations. Sediment does not change color on exposure to water column.
		No distinct sediment	Abrupt, undulatory contact
4e	0.80m-1.17m		Tan sandy silt containing scattered limestone pebbles, Oligocene echinoids, whole and fragmentary gastropods, insects, fish bone and scales, leaves and wood concentrations. Sediment changes color from tan to gray on exposure to water column.
		No distinct sediment	Abrupt, undulatory contact
4d	0.05m-0.12m		Medium-gray sandy silt
		Sandy	Abrupt, undulatory contact of sand with compressed digesta
4c	0.02m-0.17m		Light-gray sandy silt
		Sandy	Abrupt, undulatory contact of sand with compressed digesta
4b	0.03m max		Medium-gray sandy silt
		Sandy	Abrupt, undulatory contact of sand with compressed digesta
4a	0.05m-1.1m		Gray sandy silt with intermixed mastodont digesta

Table 3.5. Test C sediment observations and environmental implications

Macroscopic Observation	Environmental implication
Stratum 6 has scattered lithic artifacts and unoxidized bone artifacts	Water levels in the Aucilla have been high enough since approximately 9,800 rcybp to leave Stratum 6 intact, fully hydrated as deposited, and without obvious human disturbance
Wood on Stratum 5/6 boundary is dessicated	Dry period characterizes transition between deposition of Unit 5 and Unit 6
Boundary between Strata 5 and 6 is characterized by sand stringers	Dry, windy period characterizes transition
Stratum 5 is highly consolidated	Subaereal exposure
Stratum 5 is highly organic	Leaf-molt/organic matter accumulation was high on the site

Table 3.6. Find locations and associations of diagnostic points

Artifact Number	Test Unit	Stratum (s)	Level	Type Name	Notes
N/A	C	5/6	N/A	Bolen Plain	(Dunbar et al. 1989:Figure 3)
92A-07	G	6	2	Kirk Serrated	
95E-15	U	6	3	Kirk Corner-Notched	
95E-17	P	6	3	Kirk Corner-Notched	
95E-18	P	6	3	Bolen Bevel	
95E-241	C	5/6	N/A	Bolen Plain	

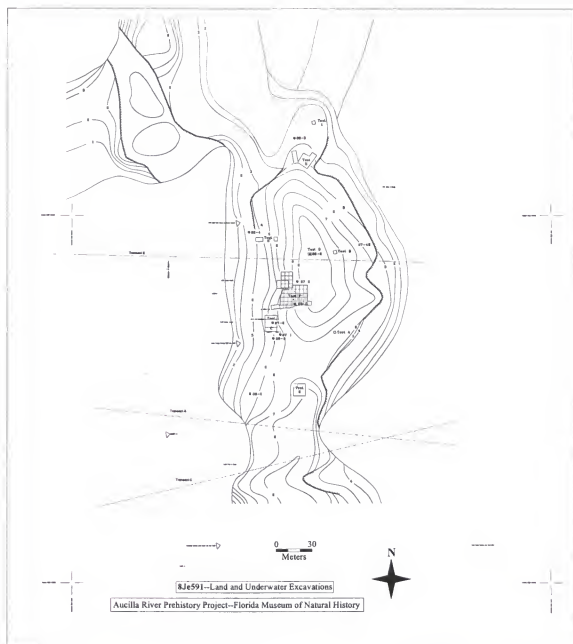


Figure 3.1. Site map of the Page/Ladson Site (8Je591) with underwater and land excavations noted. Transect lines in light purple.

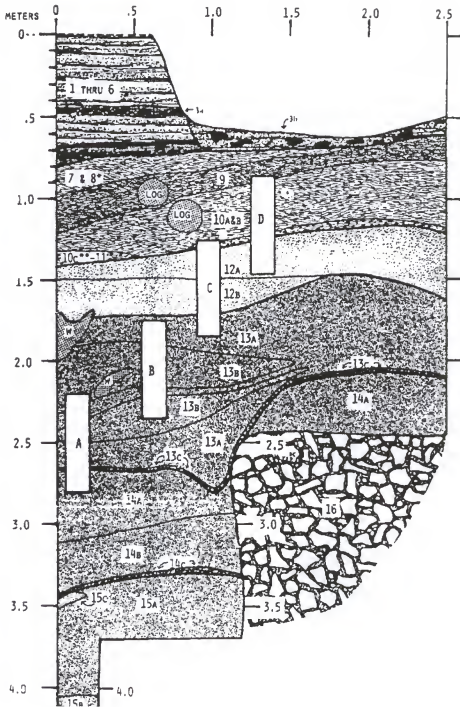


Figure 3.2. North Profile of Test B, 8Je591 (from Dunbar, Faught, and Webb 1988). Natural levels 1-7 are unconsolidated modern deposits. Levels 8-11 date to the early Holocene. Levels 12 and below are late Pleistocene in age.



Figure 3.3. Bolen Plain (top) and Bolen Bevel (bottom) projectile points from Test B



Figure 3.4. Aucilla Adzes from Test B. All adzes are from surface or deflated contexts, except upper left, which originated in level with antler flaker.



Figure 3.5. Utilized Flake from Test B.



Figure 3.6. Antler Flaker 84-527-9C from Test B on the Page/Ladson Site (8Je591)



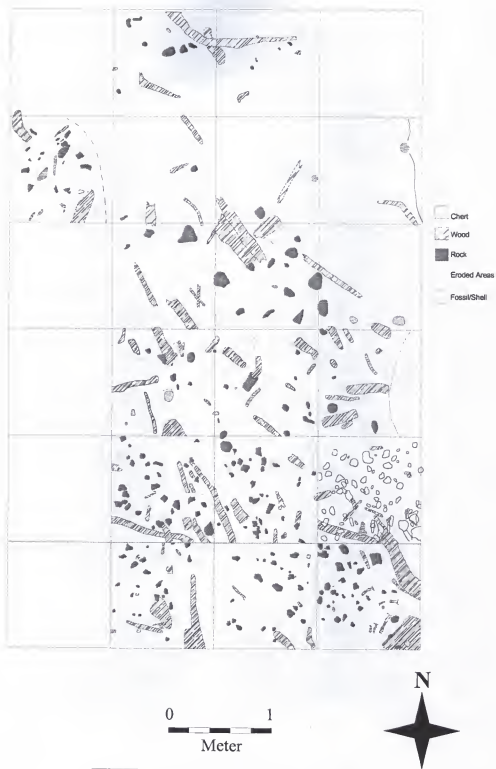
Figure 3.7. Antler Flaker 84-527-9B from Test B on the Page/Ladson Site (8Je591)



Figure 3.8. Antler tool BAR 85-59-54 from Test B of the Page/Ladson Site (8Je591)



Figure 3.9. Ground stone tool recovered from Level 12 in Test B (8Je591)



8Je591--Composite Underwater Map

Aucilla River Prehistory Project--Florida Museum of Natural History

Figure 3.10. Distribution of artifacts and ecofacts on the Stratum 5/6 boundary in Test C, G-I, O-Q, T-V.

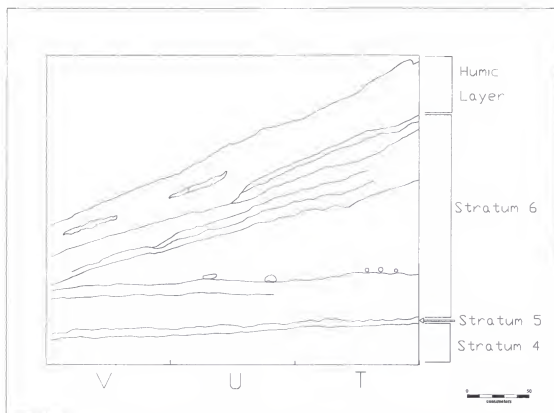


Figure 3.11. South Profile of Excavation Units T, U, and V. Soil descriptions are given in Table 3.4.

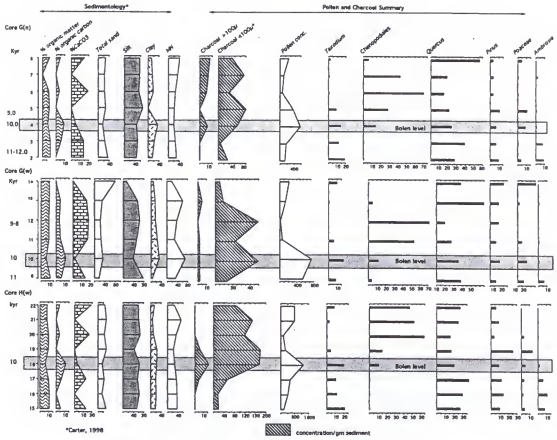


Figure 3.13. Sedimentology of---and pollen summary for---the Early Holocene levels at Page/Ladson (from Hanson 1999, Figure 9)

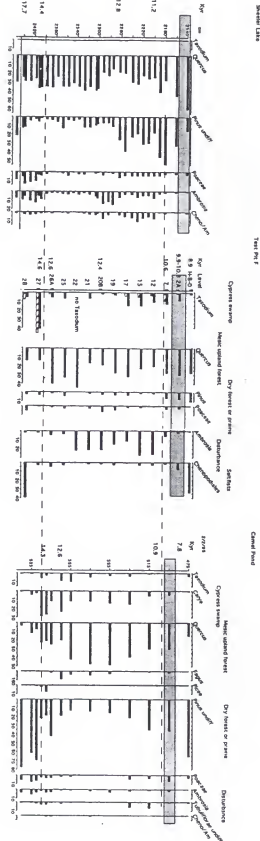




Figure 3.15. In situ wooden stake recovered from Test G.

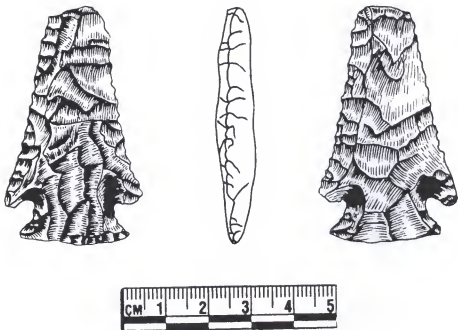


Figure 3.16. Projectile point 95E-15 (drawing by Mason Sheffield).



Figure 3.17. Projectile point 95E-17 (drawing by Mason Sheffield).



Figure 3.18. Projectile point 95E-18 (drawing by Mason Sheffield).



Figure 3.19. Projectile point 95E-241 (drawing by Mason Sheffield).



Figure 3.20. Early Holocene adze from Stratum 5/6 boundary.



Figure 3.21. Early Holocene bifacial scrapers and biface fragments



Figure 3.22. Biface, Adze, and biface fragments from the post-10,000 BP Stratum 6.
Note lighter color of cherts as compared to those the Stratum 5/6 boundary.



Figure 3.23. Cores and Core tools from the Stratum 5/6 boundary. Core fragment in upper left may be broken haft end of Aucilla Adze.



Figure 3.24. Flake tools from underwater component of Page/Ladson.



Figure 3.25. Bolo stone preforms (92A-23[top] and 95E-90[middle]) and finished, broken bolo stone (95E-95[bottom]) from Stratum 5/6 boundary (life size) (drawing by Mason Sheffield).



Figure 3.26. Dolomite abrading stones from Page/Ladson. Note triangular to trapezoidal shape of most examples.



Figure 3.27. Ground stone tool preform debitage (top) and abrader preform debitage (bottom)

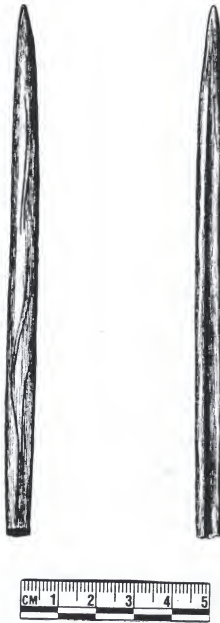


Figure 3.28. Bone pin recovered from Excavation Unit I. Note fine striations that reflect manufacturing-related abrasion and deeper scratches indicative of usewear (drawing by Mason Sheffield).

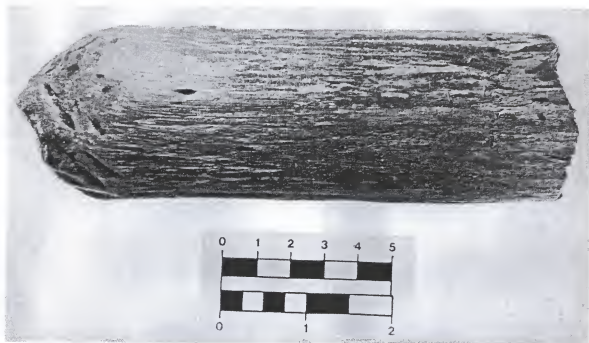


Figure 3.29. Worked wood pin from Test C.



Figure 3.30. Detail of worked wood pin from Test C.

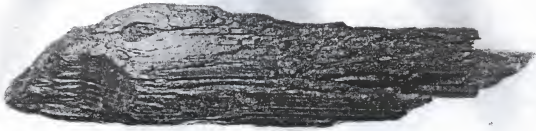


Figure 3.31. Worked wood artifact from Test C.



Figure 3.32. Detail of worked wood artifact from Test C. Note flat, cupped carving marks on end, indicative of flat-bitted adze chipping, not sawing.

CHAPTER 4 TRANSFORMATIONS OF EARLY HOLOCENE STONE TECHNOLOGY

In this chapter two critical components of the early Holocene stone tool assemblage—projectile points and ground-stone bola stones—are reviewed. Explanatory models are also proposed for the purpose of putting the observed initial and early Holocene projectile point reduction sequence in chronological perspective and put the ground “bola” stone reduction sequence in its early Holocene technological context.

Early Holocene Points from the Ohmes Collection

Between 1950 and 1970, Dr. Richard Ohmes and members of his family collected Paleoindian and Early Archaic diagnostic materials from the bottom of the Aucilla River and from its surrounding pastures in Jefferson County, Florida, and in southern Georgia around the town of Boston. Dr. Ohmes donated his collection to the Florida Museum of Natural History in 1998. Included in his collection are 121 diagnostic early Holocene, notched points (See examples in Figures 4.1-4.12). As part of this dissertation, these points were measured along with 24 points recovered by ARPP crews from Page/Ladson and Sloth Hole. Data on these points are presented Appendix B.

As with many surface-collected assemblages, little can be said about the geographic aspects of projectile point re-tooling (Daniel 1998:170-186) through examining the distribution of early-stage vs. exhausted points, much less other kinds of distribution analysis. However, if the surface-collected assemblage is examined in aggregate, there are aspects of manufacturing, resharpening, and discards that can be examined.

Early Archaic Point Reduction

Austin and Mitchell (1999:104-109, Fig. 38) have suggested a systematic reduction strategy for Bolen projectile points starting with the removal of relatively large flakes from prepared cores and continuing through discard (Figure 4.13). Several stages of reduction, finishing and resharpening have been added to the following figure (Figure 4.14) that more closely reflect a complete reduction, resharpening, and discard cycle of Early Archaic side- and corner-notched points based on both the sample from other excavated sites on the Aucilla, the Ohmes Collection, and Page/Ladson.

Evidence from early stage preforms from multiple sites suggests multiple "pre-preform" flakes were removed from either polyhedral or hemispherical cores during a single reduction episode. The results are flakes with continuous ventral surfaces and dorsal surfaces characterized by multiple negative flake scars paralleling the flakes' longitudinal axes. Overall flake size controls the ultimate size of the finished points. The next step appears to be the systematic thinning of these flakes through lateral, bifacial reduction, often with long, thin reduction flakes that extend past the mid-line of each face, and occasionally extend to the opposite edge of the preform (i.e. *outré passé* flaking). These lateral flakes are accomplished through careful platform preparation (e.g. grinding). Soft-hammer techniques were likely used during biface thinning. It is not yet clear how many rounds of lateral thinning were performed to produce a "finished" preform, or if the thinning flakes were used for expedient tools.

There appears to be a "pause" in the reduction sequence at the prepared preform stage. Preforms appear to be the preferred form for medium to long distance transportation (Goodyear 1982, 1999). Once there was a need for a more "finished" tool, point preforms were again thinned---both laterally and basally---to a finished overall

shape, notched laterally or from the corners, and the base either left unground or basally ground. The “finished” point was then hafted to some kind of dart, foreshaft, or handle.

Plotting the length vs. stem width of side-notched vs. corner-notched points (Figure 4.15) demonstrates some interesting trends in the manufacturing of both types of points. First, there is a very strong clustering among both types for stem widths between 14mm and 18mm, suggesting the shafts to which the points were hafted were approximately 15mm in diameter. Second, corner-notched points generally have a wider stem (16.7mm vs. 15.5mm) than side-notched points. Finally, there appears to be a significant grouping of side-notched projectile points over 80mm long with stem widths narrower than 15mm. Most of the projectile points of both morphologies are continuously distributed in terms of length from about 65mm to 30mm.

The overall length of Aucilla River points hints at a phenomenon observed on Clovis burial sites (e.g. Anzick [Wilke et al. 1991]) and at Dalton burial sites (e.g. Sloan [Morse et al. 1997, Goodyear 1999]), namely the segregation of points into those used for hunting purposes and those used as ceremonial or grave goods. Both tend to have the same width range, but the ones destined for use in burial rites are typically longer and are not successively reworked or otherwise intensively used for hunting or butchering activities. One Ohmes Collection example (2000-20-2-201) (Figure 4.1, middle) is 13.5cm long, an unlikely length for use as a projectile or knife. It has no use-wear or resharpening, but heavy basal grinding. The grinding implies hafting before abandonment or burial. Although it is impossible to connect the burial of projectile point/knives during the Paleoindian and Early Archaic periods with historic burial practices in the southeastern United States, the Chickasaw traditionally buried their men

with a "fighting knife" to ward off and kill spirits in the next world (Anthony Paredes 2002, personal communication).

Corner-notching and side-notching are ubiquitous across all Early Archaic projectile points in the lower Southeast. In most cases, the notching appears to have been accomplished with a deer antler tinge or a thin, hard, bone tool. In the case of side-notched points, the notch is usually initiated approximately 0.5cm above the lower corners of the projectile point and is typically at least as deep as it is long (dimension parallel to point's tip to base axis). In some types (e.g. Hardaway Dalton, St. Charles, Big Sandy, Graham Cave, Kessel [Justice 1987:39, 55, 62-64]), there is a weak to strong incurvate base associated with the side-notching. Most explanations of side-notching and basal-thinning development revolve around increasing the haft strength of the point, although that may not be the only reason (see below).

Resharpener

Resharpener is ubiquitous on both side- and corner-notched points from the Aucilla. There is a direct correlation between the number of resharpenings and the overall length of both side- and corner-notched points, as each resharpening event occurs, the overall length of the blade is reduced, although the length reduction appears to be linear and perhaps be as little as 1-2mm per episode. Additionally, in light of the potential for catastrophic blade breakages, as seen on example 95E-241 from Page/Ladson, the opposite beveling technique of resharpening could rejuvenate even this type of break through immediate, successive opposite resharpenings.

Some of the Ohmes collection examples show a two-technique resharpening strategy, as well. The main blade section, from 1-2 cm below the tip to the shoulder is resharpened bifacially, or with opposite beveling. By contrast, the area around the tip is

treated separately and either sharpened bifacially, even on some opposite beveled examples, or bevel resharpened with very fine pressure flaking that leaves little or no serration. This supports the idea forwarded by many investigators that these notched points were multiple-use projectile and cutting implements because the tip is clearly being resharpened to enhance each point's penetration capability while the edges are being opposite beveled---with serration as the result---to enhance cutting longevity and meat stripping ability.

Opposite beveling has been identified as one of the hallmarks of a large portion of side-notched and corner-notched points in Florida. Milanich (1994:54) cites an unpublished study of the Florida Museum of Natural History side-notched points where 97% of the Bolen points were resharpened in one direction. This might indicate the handedness of the makers. However, of the 144 Aucilla examples studied here, only one point was resharpened in the opposite direction, suggesting points sharpened in the opposite direction may merely be accidents, rather than an indication of handedness, which tends to split around 90% right-handed/10% left-handed in most human populations (Corballis 1997).

The examined projectile point/knives appear to be abandoned when they reach between 30mm and 40mm long (Figure 4.15). Exhaustion of the shoulder region of the point appears to be the underlying characteristic of these fully-resharpened points. As Early Archaic chertworkers narrowed the point's shoulders, the hafting became progressively more exposed, reducing the point's effectiveness as both a projectile point and as a cutting tool. The importance of not exposing the haft is confirmed by specimen 95E-241 from Page/Ladson (Figure 3.16), which appears to have been abandoned

immediately after losing one cutting edge to a burin-like blade removal. Another reason for abandoning short points may result from the reduction of their effective cutting edge to the 10mm to 20mm range, limiting their meat-cutting utility. Austin and Mitchell (1999:40) note that several points from the Jeannie's Better Back site were converted to endscrapers when they became too short to use as cutting tools. This type of converted tool may be the functional equivalent to the more systematically manufactured and resharpened Edgefield scraper (Purdy 1981:26-29), with its similar hafting and unifacial blade.

A subset of the Ohmes/ARPP Collection side-notched points has a strongly patterned shape (Figure 4.8, far left; Fig. 4.10, all). This subset appears to be uniformly derived from a very regular, flat, tapered blade or blade-like flake. Contrary to most side- and corner-notched points in the collection, these points have a reverse thickness taper (i.e. thick at the point, thinning to the haft), probably a result of having the bulb of force near the tip in the preform stage rather than near the preform shoulder or base. They have relatively tabular sides and very regular opposite beveling resulting in an even, serrated edge and a pronounced trapezoidal blade cross-section. It is unclear whether this variant has been observed on other Early Archaic sites.

In general, the flaking patterns observed for Big Sandy/Bolen/Palmer/Taylor/Kirk points by previous investigators (Justice 1987:60-82) is largely confirmed by the Ohmes/ARPP collections.

A Diachronic, Explanatory Model of Late Pleistocene to Early Holocene Projectile Point Morphologies

One of the most significant "indicator fossils" of the change from the Late Paleoindian period to Early Archaic period has been the adoption of notched and

stemmed projectile points (Anderson 2002; Anderson and Sassaman 1996; Morse 1997). Despite the recognition—even though informal—of the changing point morphology's importance, there hasn't been a rigorous, systematic attempt to explain this change in a way that bridges the change back to the socio-technical, economic, or ceremonial factors driving it. Two background issues must be synopsized prior to moving to an explanatory model that will attempt this task.

The first is establishing the socio-technic function of lanceolate points during the Paleoindian through Early Archaic period, the second is what occurred to animal populations between 10,500 and 9,500 BP that could have effected the tools used to hunt and butcher them. Several investigators have addressed the former issue, and most Paleoindian specialists favor a functional explanation for the points as the stone points for multi-component atlatl darts and knives. The strongest evidence for these functions is the association of lanceolate points with mammoth remains (Taylor et al. 1996), American mastodon (C. Andrew Hemmings 2002, personal communication), bison remains (Meltzer et al. 2002, also possibly in the Wacissa [Webb et al. 1984]), reindeer (Dincauze 2002), ground sloths (Meltzer 2002), and other large mammals. The principal problem in distinguishing hunting use (as a dart tip) from processing use (presumably as a hafted knife) is equifinality; direct association of points and skeletons could be the result of either process. Only a limited number of sites, and especially large bison kill sites (e.g. Wheat 1967), provide the type of data to distinguish the two uses. Of course, it is just as likely lanceolate points were used both for hunting (as projectiles) and butchering (Tesar 1994:24-26; Yerkes and Gertner 1997) as for exclusively one or the other.

Second, evaluations of faunal data from the latest Pleistocene fossil and sub-fossil deposits in North America suggest there is a precipitous drop off in megafaunal populations between 11,000 and 10,500 BP across much of the continent (Anderson 2001), which largely confirms what had been observed with a more limited data set in the 1980s (Graham and Lundelius 1984), and can be accurately modeled with a limited number of variables (Alroy 2001). Only a subset of megamammal species (e.g. bison, musk ox, elk, reindeer, mule deer, white-tail deer, manatee, grizzly and black bear, pronghorn, and mountain sheep) survived the transition to, and establishment of the Younger Dryas and subsequent Early Holocene (Preboreal in Europe). Aggregating and averaging the weight of all the mammals present before 11,000 rcybp and after 10,500 rcybp shows how dramatically the large end of the mammal spectrum was restructured (Table 4.1). Mean weight of large mammal species went from 654kg in the late Pleistocene to 220kg in the terminal Pleistocene and early Holocene. If one assumes a relatively steady (within 2 standard deviation) primary forest productivity over the same period, the drop in mean weights suggests that hunters would have had to produce many more projectile and cutting tools in order to maintain meat intake levels during the latter period.

In the Southeast, there was a likely increase in primary forest productivity in the early Holocene due to increases in ambient temperature and annual moisture. With no larger game competing for this plant productivity, and a range extension of mast-producing trees (Delcourt et al. 1983), populations of mast-dependent species (e.g. deer, squirrels, turkey) likely exploded due to a combination of high reproductive rates,

abundant food during mating and over winter seasons, and generally shorter and warmer winters.

Although the results of faunal restructuring during the Late Pleistocene are not completely understood, several major changes in fauna have been documented from Early to Middle Holocene occupation sites. A review of these taxa suggests while there is a broader spectrum of harvested species in the Middle Archaic, there is still a focus on relatively large mammalian taxa, with white-tail deer (*Odocoileus virginianus*) as the principal game animal in the Southeast. Ethnographic data collected by Ellis (1997) suggests stone projectile points were the preferred type for hunting large game, including deer, and most often their killing power was cited as the principal reason for its use. There are two related, but distinct inferences to draw from a focus on hunting deer.

First, the multi-thousand year heavy representation of white-tail deer on southeastern United States sites implies the species experienced a sustained population boom during the Early Holocene. Ongoing human hunting does not seem to have effected the relative importance of deer as a prey species from approximately 10,500 BP to at least 6,000 BP. Second, for human hunters to maintain meat intake levels on par or close to Late Pleistocene levels including mega-mammals, deer kill rates would have needed to be high.

Killing and butchering deer requires more useable blade length for cutting and rendering equivalent meat amounts than for larger Pleistocene game because of their smaller mean size. This would have put pressure on hunters to increase the numbers of tough projectile points and amount of available blade length on butchering tools, either through intensifying quarry stone use (i.e. make more points) or adopting stone projectile

point/knife conservation measures—especially where tool stone was scarce or unevenly distributed on the landscape, and to adopt new materials for projectile points and knives.

Hunters' responses to changes in game size---while apparently dramatic in terms of point morphology---were tempered by both what was known about the physical properties of their tool stone and the knapping techniques they used to produce fluted lanceolate points. While much Paleoindian lithic technology literature has focused on the production of fluted points (Morrow 1996:201-212; Tankersley 1994), nothing has been written about how each stage of production can be altered to produce larger points, smaller points, unfluted points, notched points, stemmed points, and other shapes of points that archeologists would recognize as "new" types.

Intensification of Quarry Stone Use

Although noone has compiled the total number of Paleoindian and Early Archaic points in the Lower Southeast and compared the numbers of each, on a qualitative level many archeologists have noted that far more side- and corner-notched points have been recovered from the landscape than lanceolate points. This has been broadly interpreted as an increase in population (Goodyear 1999, Anderson 2001, Anderson 2002). Although there are many potential explanations for the difference in numbers, there is general agreement that there was an overall increase in the amount of toolstone used during the Late Pleistocene into the Early Holocene. The overall increase in manufactured points required intensified quarrying activity. Unfortunately, few excavations have focused on early Holocene near-quarry areas---with the notable exception of Page/Ladson and the Allendale quarry sites (Albert Goodyear 2002, personal communication). When these excavations are done, not only will we know more about the structure of quarrying activity, that is to say the steps adopted to render useable cores, flakes, and blades, but we

will also be able to say more about the transport of rendered stone and manufacturing of finished tools during each period. There are already studies (Sassaman 1996, Daniel 1998:170-185) that have been used to support drainage-based band ranges and quarry-based band ranges.

Projectile Point Conservation Steps

Given the well-explored reduction sequence of lanceolate Middle and Late Paleoindian points (Morrow 1996, Wilke et. al 1991) (Figure 4.13), there are many tool-stone conservation measures that would increase the total number of finished points produced and the amount of useable blade length. These measures are logically grouped into ones involving production and ones involving reuse (Knecht 1997), which I have divided into subcategories (Table 4.2).

The model linking the adoption of these intensification/conservation processes to reductions in mean prey size predicts that more traits will be adopted sooner by populations that experience more dramatic drops in mean prey size. In North America, one would expect to see delayed adoption of tool stone intensification/conservation measures in the Great Plains and in peri-glacial areas where human populations continued to rely on relatively large game (≥ 300 kg) like bison, elk, reindeer, and large sea mammals, and more rapid adoption of conservation measures in regions where mean large game size was considerably smaller (< 100 kg), a phenomenon that appears to be robustly supported by archaeological evidence (Anderson 2001, Justice 1987:30-35).

Given a decreasing mean game size and a flexible set of potential responses in the lithic tool kit, we can model changes in projectile point morphology from the basic Clovis style to other hypothesized styles, as individual measures are adopted, either individually, or as a suite of changes (Figure 4.16). The importance of these

transformations is not the identification of named types and the morphological changes that distinguish them, but the manufacturing steps that had to change to render each new form. For most Paleoindian and Early Archaic points, the change in manufacturing steps was minimal, suggesting modifications on a single projectile point tradition, rather than some more radical socio-technic transformation. Because of the proximity of projectile point/knives to hunting activity, it is surprising how little the manufacturing process changed in the Southeast from fluted-style to side-notch-style points. Moreover, every altered step appears to have focused on increasing the available blade length for each projectile and cutting tool, rather than being focused on new ways of hunting game.

The Manufacturing and Use of Early Archaic “Bola” stones.

The adoption of ground stone tools is another traditional hallmark of the Archaic. The “bola” stone is one of the earliest examples of these ground stone tools. These stones are teardrop-shaped ground stone artifacts, sometimes with a dimple on one end (Figure 4.17). Although this artifact’s function has been proposed as a clubhead, hammerstone, milling stone, nutting stone, or bow-drill cap (Neill 1971, Whatley 1986), the principal one discussed in the literature is as a weight for an entangling devise, known as a “bola” (Cotter 1962) from ethnographic examples from South America.

Although there have been general discussions of how these artifacts were made, no one has recovered the mid-manufacturing stage artifacts to demonstrate its more detailed aspects. Early stage bola stones and completed but fractured bola stones were recovered from the Page/Ladson site (Figure 3.25). On the basis of these items, one can propose the manufacturing steps (Figure 4.17). First, a large dolomite or limestone slab or cobble was selected. Second, this slab or cobble was systematically flaked to yield a sub-round, fist-sized cobble, using the same mass-reduction techniques practiced on chert slabs and

cobbles. Third, the flaked stone preform's fractured margins were pecked and ground down to a tear-drop or round shape. Although there is no direct evidence from Page/Ladson in the form of a partially-abraded bola stone, the final shaping was probably accomplished by abrasion, as evidenced by the presence of dolomite abraders on the site. The dimple would have been ground into one end at this point, first as a flat surface, then as an indented area by rotary abrasion.

Several interesting conclusions can be drawn from the bola stone manufacturing fragments. First, their embedded find location in the Stratum 5/6 boundary establishes their early Holocene date, which had only been previously established by associations with Paleoindian and early Archaic points. Second, the use of flaking as the initial reduction method suggests that the same individuals producing chert points and tools could also produce the initial preforms for these "ground" stone tools. This in turn suggests at least some of the smaller, sub-round cores recorded from other Early Archaic sites may be preforms for this tool.

It seems likely that these ground stones were highly-curated, portable nutting stones used in conjunction with less mobile, more site specific anvil stones to render large quantities of nutmeats from mid-fall to early winter. The small, dimpled end would work well to contain potentially unstable acorns, if placed in the dimple for cracking. The stone has enough weight that the larger end—sometimes pointed—would provide enough force to crack larger, tougher hickory nuts, butternuts, chestnuts, and walnuts, without crushing delicate nutmeats. Intriguingly, many of the stones have the same overall shape as a pignut hickory nut (*Carya glabra*), and other hickory species. Smith (1986) notes that both hickory nuts and acorns were the first edible plant remains

recovered from Late Paleoindian/Early Archaic sites in the Southeast. Additionally, Brooms et al. (1997:83, 91) have documented acorn and hickory nut remains from early Holocene pit features on the Enterprise Site (1Co54), only 160km northwest of Page/Ladson. It is likely that the band of clay and sand hills that characterize the lower Southeastern Coastal Plain was a preferred habitat during the late summer, fall, and early winter due to abundant hickory and oak mast, relatively abundant water sources, game, and relative proximity to easily-extractable cherts (e.g. Tallahatta Quartzite, Flint River Chert, and St. Marks formation cherts).

The ground stone tool's high value would account for their relative rarity on early Holocene sites—the tool was carefully curated and passed from generation to generation. It would be durable enough to break only rarely and large enough to not be lost easily. Careful curation would also account for the relatively high amount of effort expended to produce the stones in materials typically used for flaked stone tools. The distribution of these tools across southern Georgia and northern Florida (Whatley 1986) appears to correspond with a lack of naturally-occurring river cobbles, suggesting the stones may have been manufactured when Early Archaic foragers anticipated prolonged occupation of these cobble-poor areas.

The presence of nutting stone preforms and broken completed stones on the Page/Ladson site suggests there was a multipurpose re-tooling station either on the site or nearby. Additionally, the flaking technique used to render the earlier-stage preforms suggests dolomite and limestone flakes normally discarded on early Holocene quarry sites may be ground-stone tool manufacturing debitage.

Table 4.1. Mean weights of extant and extinct species during the Late Pleistocene/Early Holocene

Scientific Name	Common Name	Weight KG	STATUS	Source
<i>Cervus elaphus</i>	WAPITI	500	EXTANT	Jensen 2000
<i>Alces alces</i>	MOOSE	457	EXTANT	Jensen 2000
<i>Bison bison occidentalis</i>	WESTERN BISON	422	EXTANT	South Dakota Wildlife Division
<i>Odocoileus hemionus</i>	MULE DEER	118.1	EXTANT	Jensen 2000
<i>Odocoileus virginianus</i>	WHITE-TAILED DEER	106.85	EXTANT	Jensen 2000
<i>Antilocapra americana americana</i>	PRONGHORN	68	EXTANT	Jensen 2000
<i>Oreamnos americanus</i>	MOUNTAIN GOAT	91	EXTANT	Alroy 2001
<i>Rangifer tarandus</i>	BARREN-GROUND CARIBOU	60.6	EXTANT	Alroy 2001
<i>Ovibos moschatus</i>	TUNDRA MUSKOX	286	EXTANT	Alroy 2001
<i>Ovis canadensis</i>	BIGHORN SHEEP	91	EXTANT	Alroy 2001
<i>Pecari tajacu</i>	PECCARY	30	EXTANT	Alroy 2001
<i>Mammuthus columbi</i>	COLUMBIAN MAMMOTH	5826.6	EXTINCT	Illinois State Museum
<i>Nothrotheriops shastensis</i>	SHASTA GROUND SLOTH	614	EXTINCT	American Museum of Natural History Bestiary
<i>Mammut americanum</i>	MASTODON	3297.7	EXTINCT	Alroy 2001
<i>Mammuthus primigenius</i>	WOOLY MAMMOTH	3174.2	EXTINCT	Mammoth Site
<i>Camelops hesternus</i>	YESTERDAY'S CAMEL	995	EXTINCT	Alroy 2001
<i>Glyptotherium texanum</i>	NORTH AMERICAN GLYPTODON	665.8	EXTINCT	American Museum of Natural History Bestiary
<i>Megalonyx jeffersonii</i>	JEFFERSON'S GROUND SLOTH	1320	EXTINCT	Alroy 2001

Table 4.1. Continued

<i>Bootherium bombifrons</i>	HELMETED (OR HARLAN'S) MUSKOX	753	EXTINCT	Alroy 2001
<i>Equus conversidens</i>	MEXICAN HORSE	306	EXTINCT	Alroy 2001
<i>Equus complicatus</i>		439	EXTINCT	Alroy 2001
<i>Equus francisi</i>	FRANCIS' HORSE	368	EXTINCT	Alroy 2001
<i>Equus niobrarensis</i>	NIOBRARA HORSE	533.4	EXTINCT	Alroy 2001
<i>Equus occidentalis</i>	WESTERN HORSE	574	EXTINCT	Alroy 2001
<i>Equus scotti</i>	SCOTT'S HORSE	555	EXTINCT	Alroy 2001
<i>Glossotherium harlani</i>	HARLAN'S GROUND SLOTH	1990	EXTINCT	Alroy 2001
<i>Holmesina septentrionalis</i>	HOLMESINA PAMPATHERE	312	EXTINCT	American Museum of Natural History Bestiary
<i>Platygonus compressus</i>	FLAT-HEADED PECCARY	52.5	EXTINCT	Alroy 2001
<i>Hemiauchenia macrocephala</i>	LARGE-HEADED LLAMA	238.1	EXTINCT	Alroy 2001
<i>Capromeryx minor</i>	DIMINUTIVE PROGHORN	21	EXTINCT	Alroy 2001
<i>Eucerotherium collinum</i>	SHRUB OX	498.8	EXTINCT	Alroy 2001
<i>Cervalces scotti</i>	STAG-MOOSE	485.6	EXTINCT	Alroy 2001
<i>Mylohyus fossilis</i>	LONG-NOSED PECCARY	73.5	EXTINCT	Alroy 2001
<i>Navahoceros fricki</i>	PLEISTOCENE DEER	222.6	EXTINCT	Alroy 2001
<i>Oreamnos harringtoni</i>	HARRINGTON'S MOUNTAIN GOAT	45	EXTINCT	Alroy 2001
<i>Palaeolama mirifica</i>	STOUT-LEGGED LLAMA	244.7	EXTINCT	Alroy 2001
<i>Stockoceros conklingi</i>	CONKLING'S PRONGHORN	52.5	EXTINCT	Alroy 2001
<i>Stockoceros onusrosagris</i>	PRONGHORN	53.7	EXTINCT	Alroy 2001

Table 4.1. Continued

Tapirus veroensis	VERO TAPIR	324	EXTINCT	Alroy 2001
Tetrameryx shuleri	PRONGHORN	60.6	EXTINCT	Alroy 2001
Bison priscus	PLEISTOCENE BISON	522.8	EXTINCT	Alroy 2001

Table 4.2. Tool Production Intensification and Conservation Measures

Production Measures	Result of Change	Reference
Produce more preforms	More points created Heavier quarry use	This paper
Increase preform size	Larger overall points	This paper
Reduce preform size	Smaller overall points	Ellis 1997
Cession of fluting	Increase in useable points	Goodyear 1999
Drop early-stage preform fluting	Thicker points	Goodyear 1999
Blade-based points	Retouched blade points	Goodyear 1999
Narrow haft width (notching)	Increased number of possible resharpenings	This paper
Heat treating	Improve flaking properties of most tool stone	Purdy 1981
Use and Reuse Measures		
Strengthen haft design	Change in haft morphology	This paper
Adopt unifacial resharpening	Opposite beveling of points	Milanich 1994, This paper
Conversion of blades/broken points to scrapers	Introduction of point-style hafted scrapers into assemblage	This paper



Figure 4.1. Three longest examples of Bolen Plain projectile points from Ohmes Collection.



Figure 4.2. Six Bolen Plain side-notched projectile points from Ohmes Collection.



Figure 4.3. Six Bolen Beveled side-notched projectile points from Ohmes Collection.



Figure 4.4. One Greenbriar side-notched projectile points from Ohmes Collection.



Figure 4.5. Five Bolen side-notched projectile points from Ohmes Collection that represent a continuum of resharpening (left to right) from initial manufacture to discard.



Figure 4.6. Range of straight to highly incurvate base Bolen Side-notched points, with initial opposite bevel resharpening.



Figure 4.7. Excurvate base Bolen Side-notched beveled points with rounded notches. Mid-stage resharpening. Note diversity of raw materials present.



Figure 4.8. Range of Bolen corner-notched (or Hardin Barbed) projectile points from Ohmes collection. Note very strong opposite beveled resharpener on both far right and far left examples and variety of bases.



Figure 4.9. Bolen corner-notched (Kirk corner-notched) and Kirk Stemmed projectile points from the Ohmes Collection. Note relatively large size and strong serration on middle example.



Figure 4.10. Five Bolen side-notched points from Ohmes Collection. Note long, narrow form resulting from highly-formalized opposite bevel resharpening of tabular blade. Middle three examples have reverse taper discussed in text.



Figure 4.11. Five Bolen side-notched points from the Ohmes Collection. Note range of notch shapes, from open to constricted.



Figure 4.12. Five assorted Bolen projectile points from the Ohmes collection.

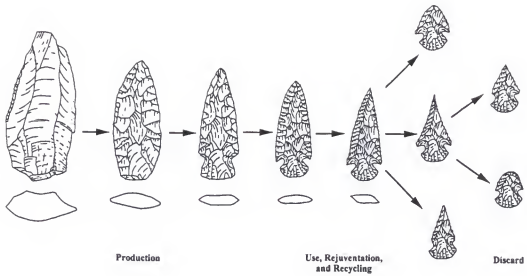


Figure 4.13. Proposed reduction sequence for Early Archaic Bolen points (redrawn from Austin and Mitchell 1999: Figure 38)

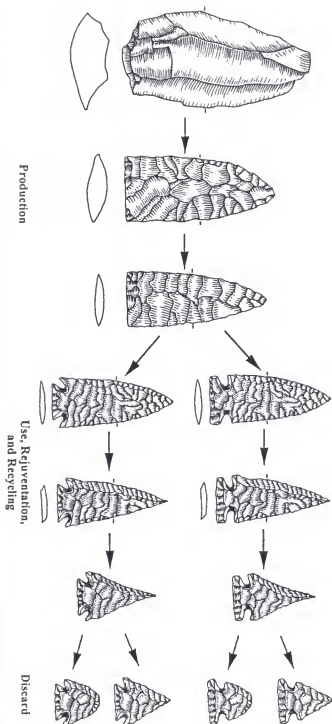


Figure 4.14. Revised Early Archaic point production, use, and discard cycle as documented from the Page/Ladson site points, points from the Ohmes Collection, and points from 8L.f54 (adapted from Austin and Mitchell 1999).

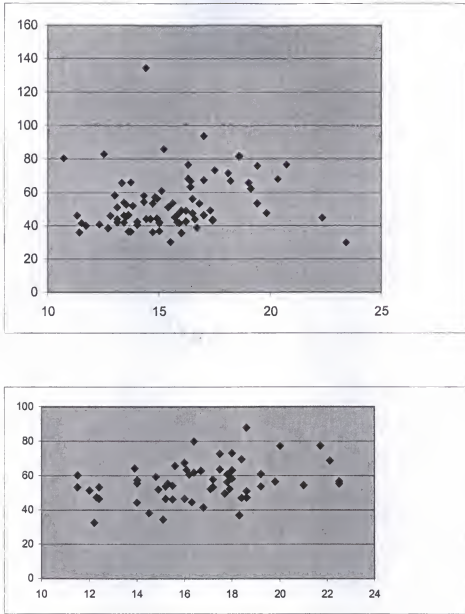


Figure 4.15. Scatterplots of length vs. stem width for points identified as side-notched (upper chart) and corner-notched (lower chart). Data from Appendix B.

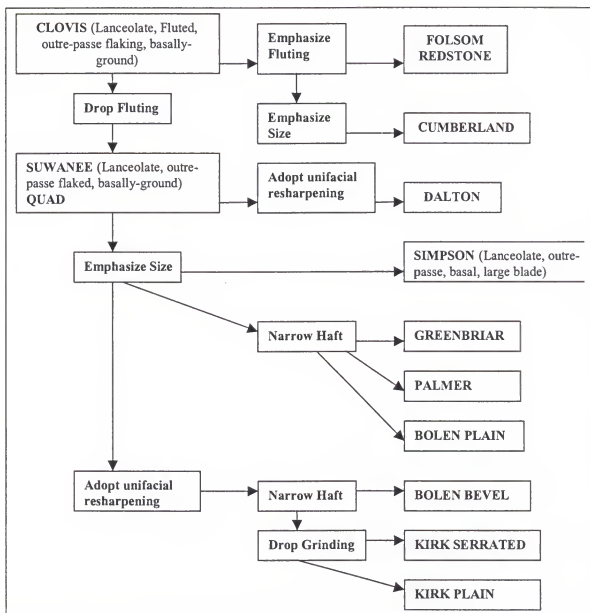


Figure 4.16. Morphological transformation of Paleoindian to Early Archaic point styles based on the addition and subtraction of individual point features (time---early to late---is roughly represented from top left to bottom right).

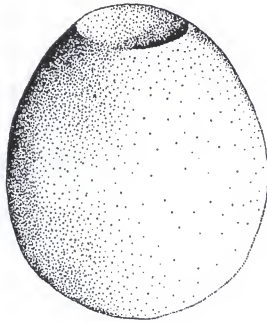


Figure 4.17. Typical shape and size of Early Archaic “bolo”, or nutting stone (redrawn from Neill 1970 by Mason Sheffield).



Figure 4.18. Artist's reconstruction of Early Archaic nutting stone manufacturing process. (drawing by Mason Sheffield).

CHAPTER 5 THE EARLY HOLOCENE BONE TOOL KIT

An early Holocene bone tool kit has never been proposed for the Southeast United States, although the use of animal bone from Holocene species is one of the most long-lived technological traditions in the North American archeological record. The early Holocene bone tool kit---as represented from Page/Ladson, Dust Cave, and Little Salt Spring---will be detailed and illustrated in this chapter. Techno-functional uses of some of the tools will be explored and the potential ceremonial uses of a few bone items will be proposed.

Bone tools and other bone artifacts played an important role in early Holocene life in the southeastern United States. Bone tools excavated from early-Middle and Middle Archaic period shell mound sites in the Tennessee Valley (Lewis and Kneeburg 1961:75-102), from the Windover site (Penders 2002), and in later sites along the southwest Florida coast (Walker 1992) encompass a much wider range of potential functions than contemporaneous stone tools. The more plastic nature of bone---its flexibility and durability---and the availability of numerous different sizes and shapes of bone contributed to its use for a wide diversity of tool and non-tool functions. Semenov (1973), Knecht (1997), and Walker (1992), are used here as points of departure for defining the functional classes of bone tools and into which functional class each bone tool fits. Semenov (1973) provides a basis for a discussion of potential ceremonial uses of some bone artifacts.

Technofunctional Categories of Early Holocene Bone Artifacts

Both ethnological and archaeological lines of evidence suggest Archaic period bone artifacts were used by prehistoric groups as part of daily activities, including flintworking, hunting/fishing, garment production, basketry, net production, music, ceremonies, and decoration. The types of artifacts that have been attributed to each of these activities are summarized below (Table 5.1).

Sites with Early Holocene Bone Tools

Most individual bone tools from Dust Cave, Page/Ladson, and Little Salt Spring fit into one of the categories. The potential systemic function of each artifact will be discussed after it is described and illustrated. Before discussing the bone artifacts, however, it is important to review briefly the stratigraphy of Dust Cave and Little Salt Spring, as they have not been previously discussed.

Dust Cave, located in northern Alabama, has been excavated yearly for over a decade (Goldman-Finn and Driskell 1994). Excavations in the cave have uncovered an extensive early Holocene occupation roughly divided by the excavators into late Paleoindian and early Side-Notched periods (Figure 5.1) based on the types of projectile points recovered from each level. Radiocarbon dates from the cave indicate an initial occupation sometime around 10,500 rcybp and on-going occupation until circa 3,500 rcybp. Excavations in the lowest two cultural levels in the cave have yielded a diversity of bone tools, mostly in the small to medium size range (Goldman-Finn and Walker 1994).

The strata from which Little Salt Spring bone tools were recovered also spans the late Pleistocene to early Holocene periods. Recent excavations by the University of Miami in the submerged deposits have been termed "Operations," each of which is a

uniform 2m x 2m test unit. Within those test units, 10cm arbitrary levels are excavated and measured from the current spring surface. Within each arbitrary level, natural strata--or loci---are tracked as either numbers or letters, followed by a letter indicating the field identification of broad material type (e.g. B=Bone) and a sequential number for that arbitrary level. An object's vertical find location and depositional zone are reflected in its catalog number.

Operation	Level	Locus	Artifact	The first artifact in level
06-	28-	8-	A-	01

Excavations in the basin area of the spring have yielded strata that were initially deposited in a subaerially-exposed, sandy basin, then---around 8,000 BP---in a shallow-water basin. Accordingly, the lower strata are sands overlain by calcareous marls and then thick peats (Dietrich and Gifford 1996). Many of the bone tools discussed below were recovered from loci that date to between 10,000 BP and 8,500 BP (Table 5.2). These loci are typically calcareous marls and quartz sands.

Antler and Bone Tools from Page/Ladson and Little Salt Spring

Antler Flakers and Probable Antler Flaker Preforms (Figures 5.2, 5.3, 5.4, 5.5)

Two antler flakers were recovered from Levels 7 and 8 in Test B of the Page/Ladson site in 1984 (Dunbar et al. 1988). This context was underlain by Level 9, which dates to 9,450±100BP (Table 3.1). The lack of an erosional contact between these three levels suggests that they are close to the same age.

The antler flakers themselves are relatively small, with the distal ends resharpened--most likely by abrasion---to a point. The two points average 3mm across. In both instances, the flakers were manufactured by systematically girdling the antler above and

below where the tine was joined to the main part of the rack. A tool very similar in shape is used by modern knappers as a notching tool (Whittaker 1994:20-25). This style of tool can also be used as a general resharpening tool for both bifacial chert points and unifacial scrapers, both tools common in early Holocene (Purdy 1981:8-21).

One possible antler flaker (06999A02, Figure 5.4) was recovered from Little Salt Spring. The artifact was discovered out of context. However, the antler surface is coated with a calcareous deposit that is common on artifacts recovered from Locus 0 and Locus 1. This example does not have evidence of working at the tip. It articulates with another antler artifact from the same context (06999A04, Figure 5.5).

Worked Antler Racks (09021A01, 09011B03, 07001A01, 06999A03) (Figures 5.6, 5.7, 5.8, 5.9)

This is a tentative grouping. Two of these racks---09021A01 and 09011B03, both from Little Salt Spring---appear to be similar in one respect, but different in another. Both have been scored and had some or all of the tines broken off. The former has clear burin-parted scoring around the first proximal tine, as well as radial parting and snapping of the second and third proximal tines. The latter has the four proximal tines broken off, but by a different method. Close examination of this artifact revealed that the slotting used to prepare the tine for separation was v-shaped scoring on the distal side of each tine (Figure 5.8), rather than radial scoring around the tine.

The former rack (09021A01) also has a pair of grooves on the first tine are slots that indicate that the tine was going to be both broken into a tip and an intermediate section. Given the antler tip recovered from nearby (see below), it seems possible that multiple tool types were rendered from individual antlers. In terms of overall appearance, antler 09011B03 looks the most like the remains of a deer costume that could

have been used for either ceremonies (e.g. dancing, ritual dragging) or hunting. The use of deer skins and antlers for hunting camouflage is well-documented among early historic Native American groups. It could even have been used for that purpose until the calotte cracked down the middle, then converted to raw material for antler projectile points, atlatl hooks, handles, or other objects.

Antler 07001A01 from Little Salt Spring has a different configuration than the previous two. Again, it was found out of context, but with the characteristic calcareous deposits that characterize early Holocene materials from the site. This artifact has two radially-removed tips. Moreover, the tips were removed on a single plane, such that the remaining antler had a flat set of resting points. This suggests a possible piece of site furniture, possibly a votive dish or cup holder. Finally, artifact 06999A03 (Figure 5.9) is both scored between the second and third distal tines and is abraded on the proximal end. Again, this antler appears to be a preform for either an antler billet, pressure flaker, or some type of combination tool.

Antler Billet/Tool (BAR 85-59-54) (Figure 5.10)

This tool was recovered from Level 10 in Test B in the Page/Ladson site which dates to circa 10,000 BP. Associated artifacts include antler flakers, a Bolen-style projectile point, and a fractured bola stone. No archaeological features were observed in this level.

Although there is a general consensus among lithic technology experts that billets were used to shape stone tools from the Paleoindian period forward in North America, few, if any, have been found in Paleoindian or early Archaic period archeological contexts. This antler tool appears to be substantially battered on one end, suggesting that it was used as a billet for soft-hammer flake removal. Perhaps more interesting is the

other end, which appears to have been systematically slotted. The slot tapers from 2.8 cm to 3.9 cm in width from one side to the other. There is no indication that a tool was hafted into the slot. The distal end of the slot has been broken out, making it difficult to fully evaluate the original tool function. However, Table 5 details a few of the tool's possible functions.

The most physical evidence exists for use as a billet and as a sinew/fiber stretcher. There is substantial battering on the proximal end. All three of the existing slot margins show evidence of grooving, possibly from drawing cordage or sinew through the slot. The grooving is only present on the slot ends, not in the slot's walls, indicating an avoidance of lateral surface use.

Although the grooving indicates a direct use for making binding material, the width and length of the slot is also consistent with the basal thicknesses and widths of many of the 100+ side-and corner-notched projectile points from the Ohmes collection (see Chapter 5), a collection made from the Aucilla River by Dr. Richard Ohmes during the 1950s-1970s and now curated by the Florida Museum of Natural History. It is highly suggestive of a gauge that this shaped slot would occur on a tool with clear billet-wear on the opposite end. The possibility that this type of slot could have held a tapered tool can not be ruled out. James Dunbar (1999, personal communication) has suggested that it was used as a spokeshave handle, or as the handle for a draw-knife.

While it seems clear that tool BAR 85-54-59 was used for at least one of the previously detailed functions, it may be a mistake to ascribe it a single function. If we view the artifact as a generalized point production tool, it could as easily have held a number of different sized *pieze d'esquis*, burins, end scrapers, and spokeshaves, and still

functioned as a gauge for sizing the completed hafts of side-notched points and Edgefield scrapers, and been used for stretching sinew and/or plant cordage. In fact, with a tool kit composed of this tool, one antler pressure flaker, and a medium-sized hammerstone, an early Holocene knapper would have possessed a fully functional point production tool kit. Given the premium placed on mobility during the Paleoindian and early Archaic periods (Kelly and Todd 1988; Anderson and Hansen 1988), it seems reasonable to predict that durable, multi-purpose tools would have been adopted to save weight and carrying space, especially when those tools required large time investments to produce. They would have been the functional equivalent of a modern multi-purpose knife, and would compliment a curated-biface lithic strategy (Goodyear 1999).

One feature on BAR 85-54-59 bears noting. The exterior of the tool from the billet end to 5cm from the slotted end is covered with a relatively solidified deposit. Macroscopically, this deposit appears to be the cumulative residue of years of dirt and sebaceous oils applied to the object, possibly through use. Without testing, this interpretation is purely speculative.

Handles (LSS 06288A01 and 05991A01) (Figures 5.11, 5.12)

Handle 06288A01 from Little Salt Spring was systematically scored 10cm from the antler's proximal end. Another groove was incomplete when the entire piece was deposited in the spring. Although it is unclear how this object would have been used, the hollowing of the end suggests that it was used as a handle "collar" used to hold a cylindrical tool, a feature that is better developed on the second example (05991A01). Although hafting evidence does not exist on any of these examples, the intuitive means of using these tools is to insert a bi-pointed bone or wooden point into the socket. The bone

pin either takes on a friction fit or could be secured with rosin or some type of collagen-based glue (e.g., hide glue).

Cups or Vessels (Table 5.4)(Figures 5.13-5.18)

These artifacts are some of the most remarkable found from early Holocene sites in the Southeast. As far as we know, no other artifact of this type has been excavated from initial or early Holocene contexts besides Page/Ladson and Little Salt Spring in the eastern United States. They are the calottes of relatively large deer (*Odocoileus* sp.) both with and without antler segments attached. The samples given here can be divided into three basic groups: carefully-worked calottes with no antler, one antler, or two antlers---or antler fragments attached.

On the specimen from Page/Ladson (95E-238, Figure 3.__), the left antler was scored at the base, then broken from the skull. The most remarkable feature of this artifact is the care with which the calotte was preserved, with bone systematically removed in a rough hemisphere moving horizontally from the top of the orbits to the parietals. This care suggests that the remaining cranial material and right antler was intended for subsequent use, possibly as a hand-held cup (Semenov 1973:167). A remarkable similarity exists between the example from Page/Ladson and one example (07001B01, Figure 5.13) from Little Salt Spring. In both cases, the calotte forms a wide, open bowl that was carefully worked to remove all cranial material below the orbit tops and mid-parietal area.

There is a striking resemblance between two other examples (07001B04, Figure 5.17, and 09011B02, Figure 5.15) from Little Salt Spring. In both examples, most of the right antler has been removed, a portion of the basocranium has been removed to form a semi-enclosed vessel, and the *foramen magnum* was retained. These features suggest that

these examples could have been used as serving vessels, with the *foramen magnum* serving as a pouring spout. These could be the functional equivalent of conch dippers recovered from later prehistoric sites and ethnohistorically documented as serving utensils for drinking rituals .

One cup (07001B02) has a unique feature in that there is a distinct hole along the sagittal suture. The hole appears to have been drilled and would easily serve as a drinking hole, a hole through which a liquid could be poured, or one used for filling the cup—which would make a liquid froth (Jerry Milanich 2002, personal communication). This feature is unique among the examples described here.

The calotte from Page/Ladson (95E-238) was recovered from Stratum 6 in Test S, 10-15cm above the Stratum 5/6 interface. This same level yielded a carbon date of $10,280 \pm 120$ BP (Beta-103888) on the organic-rich soil immediately adjacent to a Kirk-style projectile point. Although the date on this level is older than dates run on materials from the Stratum 5/6 interface, there is a good chance that minor amounts of inorganic carbon could have skewed the date older than expected for this level. All of the calottes from Little Salt were recovered from either Locus 0 or 1, which are firmly dated to the early Holocene (Table 5.2).

Bone pin (95E-209, Figure 3.28)

The single bone pin described here was recovered from Page/Ladson, Test I, Zone 6. This stratum corresponds to the period between 10,000 BP and 8,500 BP. The bone pin was found in approximately the same vertical level as the antler cup (Test S) and a Kirk (or Bolen) Corner-notched point (Test U). In the field, the pin appeared to have been deposited directly into the river bottom sediments. It came out of the sediment a light cream color. On exposure to river water---then air---the point almost immediately

began to change color to a medium tan. This seems to suggest not only that the pin had never been exposed to the tannic-stained water of the Aucilla, but that the silty-clay sediments effectively sealed the bone in a largely anaerobic, neutral-to-mildly-alkaline environment that prevented the normal darkening of bone through oxidation.

Physically, the pin appears to have been made out of the long bone of a deer (*Odocoileus virginianus*), although other ungulates can not be excluded. One end of the bone pin is sharpened to a point, while the other is broken. Close examination of the marks on the pin indicate that there was ongoing, late-stage scraping of the unfinished pin. Additionally, transverse chatter ridges indicate that considerable force was used to reduce the pin to its current size, probably with chert scrapers or flakes. Fine transverse and diagonal striations near the tip indicate use as a perforator or awl. This artifact could have been an awl, pin, or projectile point.

Antler Points (09021A02, 09021A03, 09993A02, and 06329A01, Figures 5.19 and 5.20)

Both of these Little Salt Spring points show important aspects of the bone-point manufacturing process. Both were radially parted from the parent antler. One point, assembled from 09021A02, 09021A03, and 09993A02, has clear drill marks on the interior surface of the point (Figure 5.19). Work marks on this artifact suggest several manufacturing processes, including the use of some type of vise to hold the tine during drilling. The unsmoothed, spiral marks on this artifact suggest a use for the side-notched and stemmed chert drills recovered from early Holocene sites in the Southeast. The near-circular shape of the hole and the fineness of the interior striations also suggest that either a friction drill (hand-operated) or a bow drill was used.

Doran (2001, personal communication) and Dickel (2002) have observed these types of antler points in direct association with many different individual early and Middle Archaic burials, sometimes actually imbedded into skeletal material he has examined. He suggests that this type of point could be specifically used for warfare and/or interpersonal conflicts. In terms of effectiveness, an antler point could be considered a more effective interpersonal weapon. First, the back of the tip could be packed with poison. Second, if the point hit bone in the intended target, it could easily fracture and become impossible to remove. Finally, unlike stone, which the body will spontaneously push out unless surrounded by bone (Powell and Rose 1999), bone shards would not be ejected, increasing the chance of long-term infection.

Digging implements (06261B01, 06349B01, 07001B03, Figures 5.21, 5.22, 5.23)

Two types of digging implements are represented from Little Salt Spring. The first type corresponds to a small shovel, or broad-bladed digging tool. These tools are made of deer scapula and were likely used to dig in relatively soft soils. On both examples, the scapula shovels have medial edge wear, an indication that they were either held on their lateral end, or hafted onto a wood shaft for use.

The second type is a narrow-bladed digging implement more appropriate for digging in harder soils, or in and around tree roots. The example from Little Salt Spring is made from half a deer mandible. The person who made the tool removed the molars, presumably to make it more comfortable to handle. Incisors are also missing from this example, although it is not clear whether they were purposely removed, fell out, or were worn away through use.

The presence of digging tools also implies the use of buried food and medicinal plants, which could have included sassafras, smilax, and arrowroot. In terms of animal

resources, several species of animals—including the gopher tortoise (*Gopherus polyphemus*) and other species that rely on its burrow for habitat—could be excavated using this type of digging implement in the sandy soils of peninsular Florida.

Awls (09011A04, 06290A01, 95A-2, Figures 5.24, 5.25, 5.26)

Use wear on specimen 09011A04 from Little Salt Spring (Figure 5.26) indicates it was used in a radial, or twisting motion. This is consistent with perforating hides and/or boring holes in other types of material. Additional diagonal striations further from the tip appear to be the result of sharpening episodes. The other specimen (06290A01) is made from a deer ulna, and has a broken tip. Its shape is especially conducive to heavy duty perforating tasks. The proximal articulation surface is the type of handling area that provides a secure hold on the tool.

Bone bead (06319A01, Figure 5.27)

This small bone bead is one of the oldest found in the New World. Although it is not certain exactly how these bone beads were used at the time, Middle Archaic bone beads have been found as part of burial necklaces and as part of loose fill in midden mounds. This suggests that—as is done today—beads were used in both everyday settings (e.g., personal decoration or clothing decoration) that would lead to loss, and in ritual settings.

General Considerations

The assemblages from Page/Ladson and Little Salt Spring suggest that deer antler was the most utilized type of raw material for bone tools during the early Holocene. Systematically slotting and removing tines from antler racks further suggests that the tines were being used as pressure flakers, perforators, and points. Additional slotting along the main antler shaft suggests that antler sections were used for handles, drifts,

billets, slotted multi-function tools, and possible camouflage garb. Retaining antler sections on systematically-reworked skulls yielded useable cups or antler headgear, both of possible ritual significance.

Both shed and un-shed antler pieces were recovered at the Little Salt Spring and Page/Ladson sites, indicating that deer were hunted during at least three seasons of the year: fall, winter, and spring. The girdling of antler suggests use of burin technology on both shed and un-shed antlers. It is clear from the antiquity of these specimens that the long-recognized suite of antler and bone tools dating to the early Middle Archaic period actually has its roots in the initial or early Holocene, and likely overlaps with "Paleoindian" traditions, as well. There appears to have been a major shift in bone tool manufacturing techniques from those described for the early Paleoindian period (Dunbar et al. 1989), which could have had a considerable effect on the socio-technic and ceremonial aspects of early Holocene life.

Table 5.1. A technofunctional classification of bone artifacts

Activity	Name(s)	Function(s)	References
Basket making	Needle	Weaving	Semenov 1973;
Mat making	Awl/Fid		Walker 1992
Personal decoration	Needle	Pigment Application	Semenov 1973;
	Awl	Jewelry making	McComb 1989:104
Flintworking	Billet	Flake Removal	Whittaker
	Pressure Flaker		1994:129
Garment Production	Awl	Hole puncturing	Semenov 1973
	Needle	Stitching	Goldman-Finn
	Leather smoother	Tanning/Leather finishing	and Walker 1994
Sinew processing	Grooved bone	Stretching/thinning sinew	Semenov 1973
Hunting/Fishing	Knife Handle	Handle	Semenov 1973
	Foreshaft	Joining projectile points to spear shaft	Walker 1992
	Hook	Catching fish	
	Gorge	Catching fish	
	Harpoon	Catching fish	
	Leister	Catching fish	
	Pin	Hide stretching	
	Camouflage	Hunting disguise— antler and hide	
Food Gathering	Mattock/hoe	Digging	Dunbar and Webb 1996
Net Production	Gauge	Uniform net size	Walker 1992
	Needle	Knotting	
Drinking	Dipper	Transferring liquids	Semenov 1973
	Cup	Drinking liquids	

Table 5.2. Carbon dates from Little Salt Spring (Carter and Gifford 2002)

Lab No.	Sample No.	C14 y B.P.±1σ	C13/C 12	C13 Adj. Age	Depth BSS
Beta-54180	06242W02	8140±60	-27.9	8090±60 bp	~7.10m
Beta-54897	06241W04	8790±50	-27.5	8750±50 bp	~7.10m
Beta-54181	06271W06	8460±70	-29.1	8390±70 bp	~7.35m
Beta-54896	06260W01	8610±80	-27.7	8570±80 bp	~7.26m
Beta-54898	06290W01	9010±60	-30.5	8920±60 bp	~7.55m
Beta-54182	06290W19	9060±60	-30.3	8980±60 bp	~7.63m
Beta-54179	0636ZW01	8970±60	-28.7	8920±60 bp	~8.30m
Beta-54726	0636ZW04	9020±70	-28.7	8970±70 bp	~8.3m
Beta-62562	0636ZW19	9030±90	-29.3	8960±90 bp	~8.3m

Table 5.3. Possible functions of BAR 85-59-54

Name	Possible function or systemic use
Stretcher/Fiber processor	Working sinew or cordage into usable binding materials
Gauge	Checking stem thickness and width of notched points
Handle	Holding a chert spokeshave or spatulate bone or wooden bit
Billet	Soft hammer flaker for stone tool production

Table 5.4. Range of *Odocoileus* sp. skull vessel variation

	No Antler	One Antler	Two Antlers
Open Calotte Bowl	07001B02	95E-238	07001B01
Semi-closed Vessel	09011B11	09011B02, 07001B04	
Possible Cup use	06300B02		09011B03

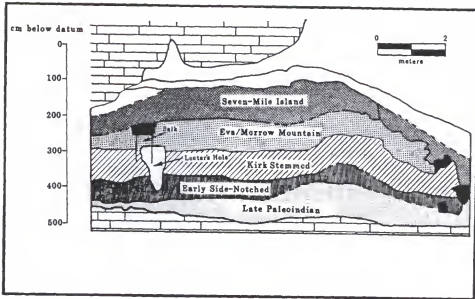


Figure 5.1. Cultural/Stratigraphic representation of levels from Dust Cave (adapted from Goldman-Finn and Driskell 1994). Bone tools from the late Paleoindian and early Side-Notched levels are comparable in age to both Page/Ladson and Little Salt Spring.

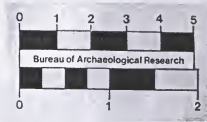


Figure 5.2: Antler Flaker 84-527-9 from Test B on the Page/Ladson Site (8Je591)



Figure 5.3. Antler Flaker 84-527-9B from Test B on the Page/Ladson Site (8Je591).



Figure 5.4. Artifact 06999A02—Possible Antler Flaker Preform from Little Salt Spring



Figure 5.5. Artifact 06999A02 and 06999A04 shown semi-articulated



Figure 5.6. Artifact 09021A01---Shed antler with removed distal tines and scored proximal tine



Figure 5.7. Artifact 09011B03---Antler rack with v-shaped tine removal.



Figure 5.8. Artifact 07001A01---Antler with radially-removed tines



Figure 5.9. Artifact 06999A03—Worked Antler



Figure 5.10. Antler tool BAR 85-59-54 from Test B of the Page/Ladson Site (8Je591)

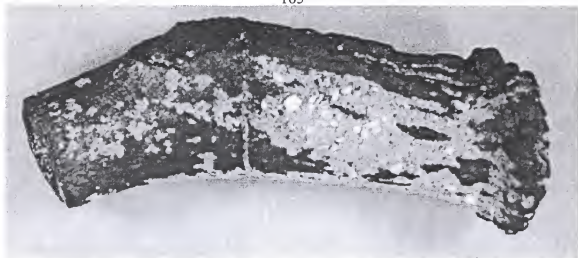


Figure 5.11. Antler handle 06288A01 with evidence of burin parting and slotting (maximum length: 12cm).



Figure 5.12. Antler handle 05991A01 with evidence of burin parting and drilling on one end.



Figure 5.13. Antler/Calotte cup 07001B01.



Figure 5.14. Systematically-reworked calotte—possible cup (07001B02). Note small circular hole on mid-line of parietal suture.



Figure 5.15. Artifact 09011B02. Possible drinking vessel



Figure 5.16. Deer skull (09011B11) with systematically-removed right lower occipital



Figure 5.17. Deer Skull (07001B04) with systematically-removed ventral portion



Figure 5.18. Deer cranium (06300B02) possibly used as vessel. (maximum length: 10cm)



Figure 5.19. Antler projectile point tip consisting of 09021A02, 09021A02, and 09993A02.



Figure 5.20. Socketed antler projectile point 06329A01 with evidence of radial drilling (maximum length: 4cm).



Figure 5.21. Deer Scapula 06261B01. Note breakage of medial edge (maximum length. 17cm).

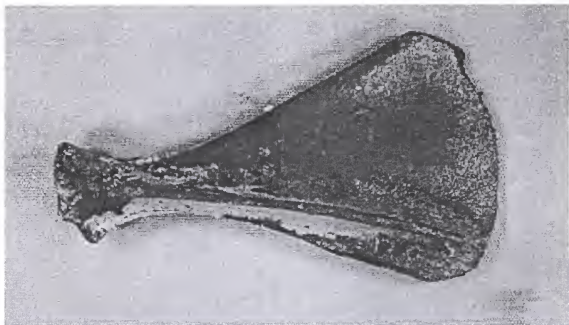


Figure 5.22. Scapula 06349B01. Note wear along medial edge, on left (maximum length [top of item to bottom]: 9cm).



Figure 5.23. *Odocoileus* sp. left mandible (07001B03) used as digging implement. Note abrasion on base of proximal end and breakage of distal end.



Figure 5.24. Bone Awl (09011A04) made from deer ulna.



Figure 5.25. Bone Awl (09011A04) detail showing diagonal striations near tip.



Figure 5.26. Bone awl (06290A01) with broken tip (maximum length: 14cm)

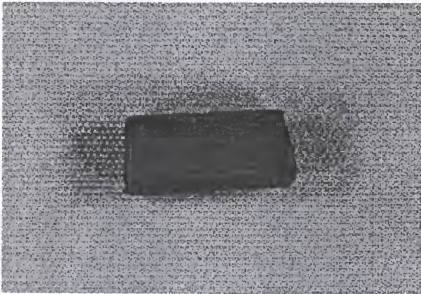


Figure 5.27. Bone bead (06319A01) (maximum length: 1.7cm, diameter: 0.8cm).

CHAPTER 6 SUMMARY AND CONCLUSIONS

Overview

There were two principal objectives to this dissertation. First, to provide detailed descriptions of material recovered from the underwater and land components of the Page/Ladson site. The second objective was to document and discuss the early Holocene stone and bone tool assemblages from Page/Ladson and Little Salt Spring and discuss them in terms of changing early Holocene foraging strategies. Both objectives have been met.

This work has contributed to Florida archaeology methodologically, in substance, and theoretically. On methodology, it is clear that excavations under water and on land at the same site are complementary. At the time most of the site was deposited, there was no "underwater/terrestrial" dichotomy. Through the subsequent inundation of one part of the site, site features and organics were preserved that would not have been otherwise. On many historic sites, excavation of land and underwater archeological components of near-water sites tends to expose different components of the social systems that created them (e.g. architecture/domestic life vs. boat-building/commerce). Excavation of the "total" prehistoric site, underwater and on land, shows that it can be done---and should be done where the results of such amphibious archaeology are complementary.

On the substantive side, Page/Ladson and Little Salt Spring have some of the earliest excavated bone tools from the Southeast. Documenting bone tools from this site defines preliminarily the bone tool assemblage for the early Holocene Southeast.

Moreover, finding pre-completion forms and fragments of completed early Holocene ground stone tools illuminates their previously-undocumented manufacturing and use. Correlating these bone and stone tools with a suite of radiocarbon dates solidifies the antiquity of both tool classes in the Americas, and strongly suggests that ground stone tools were either produced or developed during the late Pleistocene, but at low enough numbers to not appear on many late Pleistocene sites. Dated projectile points from Southeastern sites also suggests that the "horizon" model of projectile point style changes does not capture the complexity of how they were manufactured and used. It seems just as likely that different point styles were used concurrently for different game animals. Where deer were the exclusive large game animal, lithic craftspersons rapidly adopted notched points and stabilized production around side- and corner-notched forms.

Theoretically, part of this dissertation proposed an explanatory model of point transformation from the late Pleistocene through early Holocene. By linking points closely to the game they were intended to kill and butcher, the model does not have to rely on anything other than faunal community transformations to explain transformations in point morphology. Additionally, the model avoids discussing the ceremonial and/or ritual aspects of point production and burial, most of which are probably unretrievable from the archeological record. Artifacts from Page/Ladson also have provided limited support to the hypothesis that early Holocene hunter/foragers were pursuing mixed subsistence strategies prior to 10,000 BP. It seems like the ground bolo stones were a curated tool, like other curated tools in early Holocene assemblages, but directed at extracting previously untapped resources.

Early Holocene Human Settlement in North Florida

Early Holocene human settlements in north Florida were directed at balancing access to different human needs (water, food, chert resources, mating networks, ceremonial goods). Page/Ladson, with points, bifaces, abraders, handstones or nutting stones, and evidence of hearths and vertical structures, fits into that regional settlement system. The diversity of stone tools on the site, and the presence of camp-like site features suggests that it was either a multi-purpose logistical procurement station for different types of stone tools, or it was a component of a larger base camp located nearby. Other sites near Page/Ladson (e.g. 8Le2105, 8Le73, and 8Lf54) appear to be large base camps with longer-term occupation and re-occupation.

Environmental evidence from sites in north Florida suggests that an increase in hickory trees in the Tallahassee Hills subregion may have opened a niche for local hunter/foragers. The use of hickory nuts on other Southeastern sites is well-documented during the early Holocene, both near Page/Ladson and further north in the upper Coastal Plain and Piedmont. Page/Ladson, with access to water, abundant nearby chert quarries and dolomite outcrops, would have been a prime location for “gearing up” for hunting and foraging trips into the Red Hills and Gulf Coastal lowlands subregions where those resources were not easily available. By the time Page/Ladson was occupied, early Holocene inhabitants of north Florida were well-versed with seasonally-available food resources. Using this knowledge, they probably scheduled early fall visits to north Florida quarry areas to make stone tools, mid-to-late fall visits to the Red Hills hickory, persimmon, and oak groves to harvest nuts, squirrels, and deer, and late winter to early spring visits to the now-drowned Gulf coast to harvest fish, migrating birds, and other

coastal food resources. These same inhabitants likely harvested fish, shellfish, crabs, and native plums, berries, and tubers during the late spring and summer.

Binford's (2001) model predicts that an upward shift in the effective temperature will result in increased reliance on plant foods by hunter/foragers. There appears to be support for this model in the increased utilization of plant resources by early Holocene peoples in the southeastern United States. However, the dating of most southeastern late Pleistocene/early Holocene sites is not good enough to causally link the environmental change to the human shift in resource use. The environmental picture may be complicated by human control over important land-altering processes like fire. The increase in charcoal found in post-10,000 BP Page/Ladson sediments could be the result of either natural factors (lightning) or human causes (land burning, camp fires). Early Holocene hunters may have noted the effectiveness of burning at improving the habitat quality for human-favored species (e.g. turkey, quail, deer), and adopted it as a strategy for improving hunting yields. Advantages would have included increased ease of hunting (open understory), game congregation during burning, increased amount of "edge" habitat preferred by deer, improved early spring grass for deer and birds, and selection for larger nut-bearing trees in mixed hardwood hammocks. Even one natural fire would have demonstrated the advantages of this land-management technique to early Holocene inhabitants of north Florida.

The circumscription of hunter/gatherer groups in north Florida that may have caused the shift to forest plant products may also have provided a motivation to pursue aquatic food resources. If this is the case, there should be early Holocene coastal middens located on the submerged continental shelf. If this is the case, early middle

Archaic middens found on the Florida Gulf Coast (Russo 1996) are just the first middens to not be completely inundated by rising seas.

Further Research

Florida archeologists and the collector community have long been interested in the Late Pleistocene and early Holocene sites and artifacts. A Florida early Holocene survey should be attempted to search for single-component lanceolate, mixed lanceolate-early notched, and single-component notched point sites. These types of sites would provide the types of dates, stone and bone tools, and intra- and inter-site distribution data that would clarify the boundaries and longevity of Florida's Late Pleistocene/Early Holocene hunter/gatherer groups.

Such a survey should first focus on first and second magnitude springs. Large Paleoindian and Early Archaic sites have been tested and/or excavated around Wakulla Spring, Darby and Hornsby Spring, and Silver Spring. Florida river valleys and stream junctions that would have intermittently held water during the Pleistocene/Holocene transition should also be targeted using sampling strategies that have been used effectively on large tracts elsewhere in the country. Ridge areas with broad vistas should be sampled. Evidence from Alaska and other areas suggests that Paleoindians used these areas to ascertain the location of game animals and to plan hunting. Additionally, previously-excavated Paleoindian sites with good stratigraphy should be revisited with the clear aim of gathering datable materials.

Using projectile points as the means to infer social differences, as has been done to characterize late Pleistocene and early Holocene settlement in the southeast, seems to be fraught with problems. These proposed social boundaries should be tested by comparing entire stone tool assemblages from each area. Such tests would give us a better idea of

whether the social boundaries really existed, or if the projectile point style differences were just superficial differences in a more stable late Pleistocene to early Holocene tool tradition. Early Holocene emphasis on blade tools in the Tennessee River valley (Kimball 1996) would suggest such a stable tool tradition.

Another productive line of research would be to use the extensive database on ethnographically-known hunter/foragers from similar effective temperature (ET) zones, predict site types and locations based on favored habitats for known early Holocene food resources, and test those modeled locations against both existing Florida Master Site File data and archaeological testing. Finally, an extensive excavation of a larger residential base camp with good stratigraphy would help characterize the total stone tool assemblage of early Holocene foragers as well as help archaeologists determine how an early Holocene camp was arranged. Without information about site construction and dwelling arrangements, important aspects of early Holocene band-level social interaction will remain unknown.

APPENDIX A
CATALOG OF FINDS OF SURFACE COLLECTED EARLY ARCHAIC
DIAGNOSTICS AND MATERIALS EXCAVATED FROM EARLY ARCHAIC
DATED PROVENIENCES

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
85A.059.000036.0001	BIFACIAL CHOPPER	1	not weighed	
85A.059.000036.0002	DEBITAGE	1 BAG	not weighed	
85A.059.000036.0003	DEBITAGE	1 BAG	not weighed	
85A.059.000036.0004	DEBITAGE	1 BAG	not weighed	
85A.059.000036.0035	UTILIZED FLAKE W/ POLISH	1	not weighed	
85A.059.000037	DEBITAGE	1 BAG	not weighed	
85A.059.000037.0001	DEBITAGE FLAKE	1	not weighed	
85A.059.000037.0002	GROUND STONE, BOLO	1	not weighed	
85A.059.000039.0009	ANTLER KNIFE HANDLE FRAGMENT	1	not weighed	
85A.059.000039.0011	HAMMERSTONE	1	not weighed	
85A.059.000039.0032	BIFACE, BOLEN BEVELED	1	not weighed	
85A.059.000039.0033	BIFACE, BOLEN BEVELED	1	not weighed	
85A.059.000039.0034	BIFACE, BOLEN BEVELED	1	not weighed	
85A.059.000041.0001	DEBITAGE	1 BAG	not weighed	
85A.059.000041.0031	BIFACIAL SCRAPER	1	not weighed	
85A.059.000045.0001	BIFACIAL CHOPPER	1	not weighed	
85A.059.000046.0001	SANDSTONE BALL (SMALL)	1	not weighed	
85A.059.000046.0002	BIFACE FRAGMENT	1	not weighed	
85A.059.000046.0005	DEBITAGE	1 BAG	not weighed	
85A.059.000046.0012	HAMMERSTONE	1	not weighed	
85A.059.000046.0013	HAMMERSTONE	1	not weighed	
85A.059.000054	DEBITAGE	1 BAG	not weighed	
85A.059.000054	MODIFIED, UNSORTED	1 BAG	not weighed	
85A.059.000054	CHARCOAL	1 BAG	not weighed	
85A.059.000054	POTTERY	1 BAG	not weighed	
85A.059.000054.0001	UNIFACE TOOL, SCRAPER (84.527.9.22)	1	not weighed	
85A.059.000054.0002	SHATTER	1	not weighed	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
85A.059.000054.0003	DEBITAGE	1 BAG	not weighed	
85A.059.000054.0004	DEBITAGE	1 BAG	not weighed	
85A.059.000054.0005	WORKED BONE PIN OR AWL FRAGMENT	1	not weighed	
85A.059.000054.0006	TOOL, ANTLER	1	not weighed	
85A.059.000056.0001	BIFACE, DALTON ADZE	1	not weighed	
85A.059.000057	MODIFIED, UNSORTED	1	not weighed	
85A.059.000057	DEBITAGE	1 BAG	not weighed	
85A.059.000057	POTTERY	1 BAG	not weighed	
85A.059.000057	MODIFIED, CORE	1	not weighed	
85A.059.000059	DEBITAGE	1 BAG	not weighed	
85A.059.000059	FOSSIL, UNMODIFIED	1	not weighed	
85A.059.000059	CHARCOAL	1 BAG	not weighed	
85A.059.000059	POTTERY	1 BAG	not weighed	
85A.059.000059	FAUNAL BONE	1 BAG	not weighed	
87A.009.000058.0030	BIFACE, GREENBRIAR	1	not weighed	
87A.009.000060.0005	DEBITAGE	1 BAG	not weighed	
87A.009.000060.0006	MODIFIED, UNIFACE	1	not weighed	
87A.009.000060.0007	MODIFIED, HAMMERSTONE	1	not weighed	
87A.009.000061.0008	DEBITAGE	1 BAG	not weighed	
87A.009.000061.0009	MODIFIED, UNIFACE	1	not weighed	
87A.009.000061.0010	UNIFACE TOOL, WEDGE FLAKE SCRAPER	1	not weighed	
87A.009.000061.0011	BIFACE, ADZE BIT	1	not weighed	
87A.009.000061.0012	BIFACE, PREFORM	1	not weighed	
87A.009.000063.0013	ROCK SAMPLE	1 BAG	not weighed	
87A.009.000063.0014	DEBITAGE OF LARGE GRAINED ROCK	1 BAG	not weighed	
87A.009.000063.0015	DEBITAGE	1 BAG	not weighed	
87A.009.000063.0016	MODIFIED, HAMMERSTONE	1	not weighed	
87A.009.000063.0017	UNIFACE TOOL, SCRAPER/KNIFE	1	not weighed	
87A.009.000063.0018	UNIFACE TOOL, SCRAPER FRAGMENT	1	not weighed	
87A.009.000063.0019	BIFACE CONICAL CORE	1	not weighed	
87A.009.000063.0020	BIFACE, ADZE BIT	1	not weighed	
87A.009.000063.0021	BIFACE, ADZE BIT	1	not weighed	
87A.009.000063.0031	CORES, LARGE GRAINED POROUS ROCK	2	not weighed	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
87A.009.000070.0022	LARGE GRAINED CHERT	1	not weighed	
87A.009.000070.0023	DEBITAGE, LARGE GRAINED CHERT	1 BAG	not weighed	
87A.009.000070.0024	DEBITAGE	1 BAG	not weighed	
87A.009.000070.0025	UNIFACE TOOL, SCRAPER	1	not weighed	
87A.009.000070.0026	UNIFACE TOOL, SCRAPER	1	not weighed	
87A.009.000070.0027	BIFACE, PREFORM	1	not weighed	
87A.009.000079.0001	DEBITAGE FLAKE	1	not weighed	
88A.011.000092.0023	DEBITAGE (2 FLAKES)	2	not weighed	
88A.011.000094.0001	ROCK SAMPLE, NON- CULTURAL	1 BAG	not weighed	
88A.011.000096.0003	ROCK SAMPLE, NON- CULTURAL	1 BAG	not weighed	
88A.011.000096.0024	UTILIZED FLAKE/ UNIFACE TOOL	1	not weighed	
88A.011.000096.0025	DEBITAGE FLAKE	1	not weighed	
88A.011.000096.0026	DEBITAGE FLAKE	1	not weighed	
88A.011.000097.0001	UNMODIFIED, CLAY ROCK SAMPLE	1 BAG	not weighed	
88A.011.000098.0001	UNMODIFIED, CLAY ROCK SAMPLE	1 BAG	not weighed	
88A.011.000098.0002	UNMODIFIED, ROCK SAMPLE, NON CULTURAL	1 BAG	not weighed	
88A.011.000098.0027	BIFACE, PREFORM TIP	1	not weighed	
88A.011.000098.0028	DEBITAGE (N=3)	3	not weighed	
88A.011.000103.0002	UNMODIFIED, ROCK SAMPLE, NON CULTURAL	1 BAG	not weighed	
88A.011.000103.0018	MODIFIED, CORE	1	not weighed	
88A.011.000103.0019	MODIFIED, HAMMERSTONE	1	not weighed	
88A.011.000103.0020	GROUND STONE, BOLO?	1	not weighed	
88A.011.000103.0021	DEBITAGE	1 BAG	not weighed	
88A.011.000106.0022	MODIFIED, CORE	1	not weighed	
88A.011.000110.0029	BIFACE, PREFORM BASE	1	not weighed	
88A.011.000110.0030	MODIFIED, UNIFACE	1	not weighed	
88A.011.000110.0031	DEBITAGE	1 BAG	not weighed	
88A.011.000111.0045	BIFACE, LANCEOLATE PREFORM	1	not weighed	
88A.011.000112.0032	DEBITAGE	1 BAG	not weighed	
88A.011.000118.0034	DEBITAGE (N=2)	2	not weighed	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
88A.011.000133.0005	UNIFACE TOOL, THUMBNAIL SCRAPER	1	not weighed	
88A.011.000133.0035	BIFACE, BOLEN BEVELED	1	not weighed	
88A.011.000133.0076	CORE W/ADZE-LIKE SHAPE	1	not weighed	
88A.011.000133.0077	UNIFACE TOOL, SCRAPER/ADZE (N=2)	2	not weighed	
88A.011.000133.0089	WORKED IVORY FORESHAFT FRAG.	1	not weighed	
88A.011.000134.0019	DEBITAGE	1 BAG	not weighed	
88A.011.000134.0020	DEBITAGE	1 BAG	not weighed	
88A.011.000134.0021	DEBITAGE	1 BAG	not weighed	
88A.011.000134.0022	DEBITAGE	1 BAG	not weighed	
88A.011.000134.0023	DEBITAGE	1 BAG	not weighed	
88A.011.000134.0024	DEBITAGE, FLAKE WITH GRAVER SPURS	1	not weighed	
88A.011.000134.0025	UNIFACE TOOL, SCRAPER	1	not weighed	
88A.011.000134.0026	UNIFACE TOOL, SCRAPER/CUTTING TOOL	1	not weighed	
88A.011.000134.0027	UNIFACE TOOL, SCRAPER/ADZE	1	not weighed	
88A.011.000134.0028	UNIFACE TOOL, SCRAPER/KNIFE W/GRAVER	1	not weighed	
88A.011.000134.0029	UNIFACE TOOL, SCRAPER/CUTTING TOOL	1	not weighed	
88A.011.000134.0030	UNIFACE TOOL, SCRAPER	1	not weighed	
88A.011.000134.0031	UNIFACE TOOL, CUTTING TOOL W/GRAVER	1	not weighed	
88A.011.000134.0032	CORE, BIFACIAL	1	not weighed	
88A.011.000134.0033	SHERD, DEPTFORD LINEAR CHECK STAMPED	1	not weighed	
88A.011.000134.0034	DEBITAGE, PATINATED LITHICS	1 BAG	not weighed	
88A.011.000134.0035	CORE, BIFACIAL	1	not weighed	
88A.011.000134.0036	BIFACE PREFORM? BASE FRAGMENT	1	not weighed	
88A.011.000134.0037	CORE, BIFACIAL	1	not weighed	
88A.011.000134.0038	CORE, BIFACIAL	1	not weighed	
88A.011.000134.0039	CORE, BIFACIAL	1	not weighed	
88A.011.000134.0040	CORE, BIFACIAL	1	not weighed	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
88A.011.000134.0041	CORE, BIFACIAL	1	not weighed	
88A.011.000135.0007	BIFACE FRAGMENT, BOLEN PLAIN?	1	not weighed	
88A.011.000136.0009	IVORY FORESHAFT FRAGMENT	1	not weighed	
88A.011.000136.0038	BIFACE BASE, LANCEOLATE	1	not weighed	
88A.011.000136.0060	BIPOLAR FLAKE	1	not weighed	
88A.011.000136.0066	UNIFACE TOOL, TURTLE BACK SCRAPER	1	not weighed	
88A.011.000138.0001	BIFACE, CRUDE ARCHAIC STEMMED POINT	1	not weighed	
88A.011.000138.0002	UNIFACE TOOL, TEARDROP SCRAPER	1	not weighed	
88A.011.000138.0039	BIFACE, LANCELOT BASE	1	not weighed	
88A.011.000138.0040	BIFACE, GREENBRIAR	1	not weighed	
88A.011.000138.0041	BIFACE, BOLEN BEVELED	1	not weighed	
88A.011.000138.0042	BIFACE, BOLEN BEVELED	1	not weighed	
88A.011.000138.0043	BIFACE BASE, BOLEN BASE, SIDE NOTCHED	1	not weighed	
01A.048.000001.0001	BIFACE, BOLEN CORNER NOTCHED, BROKEN	1	not weighed	
92A.01.1	Sherd, Deptford Cross Simple	1	26.4	sooted
92A.01.2	Preform, Cortex	1	13.5	banded chert
92A.02.1	Wood	27	21.4	
92A.02.2	Echinoid	2	6.2	
92A.03.1	Flake, Decortication	4	32.5	honey, gray chert
92A.03.2	Abrader	2	152	
92A.03.3	Rocks, Fractured	10	336.9	gray
92A.03.4	Gastropoda	100	37.6	
92A.03.5	Testudines	69	33.7	
92A.03.6	Serpentes, Vertebra	4	0.81	
92A.03.7	Osteichythes	12	2.2	
92A.03.8	Soil Concretions	50	31.9	
92A.03.9	Residue, Sample	100	4.3	
92A.04.1	Gastropoda	55	13.6	
92A.04.2	Osteichythes	64	7.3	
92A.04.3	Flake, Unmodified	1	0.7	
92A.04.4	Testudines	47	98.1	
92A.04.5	Flake, Unmodified	1	87.4	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
92A.04.6	Pebble	3	40.6	
92A.04.7	Pebble	5	19.8	
92A.04.8	Reptilia, Vertebra	2	0.5	
92A.04.9	Bivalvia	17	9.3	
92A.04.10	Coprolite	3	0.7	
92A.04.11	Aves	1	0.3	
92A.04.12	Amphibia	2	0.2	
92A.05	NOT USED			
92A.07.1	Projectile Point, Kirk-Serrated, assymetrical	1	31.4	side-notched
92A.09.1	Scraper, uid, Debitage (?)	1	152.6	
92A.10.1	Cobble	4	501.1	
92A.10.2	Pebble, Abrader (?)	2	71.8	
92A.11.1	Gastropoda	100	68.8	
92A.11.2	Testudines, drilled	1	1.6	worked
92A.11.3	Reptilia	1	0.5	Alligator scute (?)
92A.11.4	Testudines	10	10.3	
92A.11.5	Coprolite	15	13.6	
92A.11.6	Osteichythes	27	3.9	
92A.11.7	Charcoal	8	0.7	
92A.11.8	Reptilia	1	0.1	
92A.11.9	Aves	2	0.4	
92A.12.1	Cobble	3	328	
92A.12.2	Cobble	3	118.6	
92A.12.3	shatter	4	30.5	
92A.12.4	Pebble	11	30.6	
92A.12.5	Pebble	5	12	
92A.14.1	Charcoal	4	18.5	
92A.15.1	Pebble	1	9.2	
92A.16.1	Scraper, noncortical	1	22	Has crystalline quartz on back (pretty)
92A.16.2	Wood	4	0.1	Fragments
92A.17.1	Flake, Unmodified	1	2.9	
92A.18.1	Flake, Unmodified, cortical	1	22.3	
92A.19.1	Core, cortical	1	179.4	medium gray
92A.20.1	Cobble	1	175.6	possible abrader
92A.21.1	Gastropoda	50	21	
92A.21.2	Testudines	32	41.3	
92A.21.3	Testudines, drilled	1	0.1	worked
92A.21.4	Osteichythes	23	6.7	
92A.21.5	Coprolite	8	2.7	
92A.21.6	Wood	24	1.8	one acorn and caps
92A.21.7	Charcoal	15	3.2	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
92A.21.8	Reptilia	2	0.2	
92A.21.9	Mollusca	2	0.2	
92A.22.1	Gastropoda	6	4.9	
92A.22.2	Osteichythes	4	1.2	
92A.22.3	Testudines	4	1.7	
92A.22.4	Preform	1	21.1	
92A.22.5	Flake, Unmodified	1	7	
92A.22.6	Scraper, side, Adze	1	124.5	
92A.23.1	Stone, bolo, Preform	1	163	
92A.23.2	Flake, Unmodified	1	13.8	
92A.23.3	Debitage	1	39.5	
92A.27.1	Debitage	1	10.5	
92A.27.2	Debitage	1	1.8	
92A.28.1	Gastropoda	1	2	
92A.28.2	Wood, Burned and Unburned	5	2.5	
92A.28.3	Coprolite	3	0.5	
92A.28.4	Osteichythes	59	32.5	
92A.28.5	Testudines	19	14.9	
92A.28.6	Aves	1	0.3	
92A.28.7	Mammalia, cf. Carnivora femur	1	20.3	
92A.50.1	Debitage	1	41.8	
92A.51.1	Testudines	1	12.3	
92A.52.1	Flake, Unmodified	1	33	
92A.53.1	Debitage	1	39.8	
92A.54.1	Ground Stone	1	85	
92A.55.1	Abrader	1	37.7	
92A.56.1	Gastropoda	2	0.7	
92A.56.2	Testudines	1	0.5	
92A.57.1	Cobble	1	624	
92A.58.1	Cobble, Abrader (?)	1	645.4	
92A.58.2	Cobble	3	424.4	
92A.58.3	Pebble, Abrader (?)	1	21.7	
92A.58.4	Debitage	2	22	
92A.58.5	Flake, Unmodified, blade	1	10	
92A.58.6	Chondrichthyes	1	0.2	
92A.58.7	Wood, Unburned	30	8.2	
92A.58.8	Charcoal	26	3.5	
92A.58.9	Reptilia	18	4.1	
92A.58.10	Osteichythes	100	24.8	
92A.58.11	Mammalia	7	5.1	
92A.58.12	Testudines	100	64	
92A.58.13	Bivalvia	12	7.3	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
92A.58.14	Gastropoda	100	60.3	
92A.58.15	Coprolite	28	1.7	
92A.58.16	Sample Residue	N/A	58.9	
92A.58.17	Sample Residue, Bulk	N/A	246	
94B.1.1.1	Whole flakes, cortical and noncortical	21	84.7	
94B.1.1.2	Incomplete flakes, cortical and noncortical	22	35.7	
94B.1.1.3	Fragmentary flakes, cortical and noncortical	27	18.6	
94B.1.1.4	Flake tool, noncortical	6	56.8	
94B.1.1.5	Shatter, cortical and noncortical	13	8.4	
94B.1.1.6	Shatter	51	432.8	
94B.1.1.7	Sherd, Deptford Cross Simple Stamp	2	34.3	
94B.1.1.8	Sherd, Deptford Simple Stamp	2	10	
94B.1.1.9	Sherd, Wakulla Check Stamp	9	49.6	
94B.1.1.10	Sherd, Chattahoochee Brushed	2	4.3	
94B.1.1.11	Sherd, UID Check Stamp	1	0.5	
94B.1.1.12	Sherd, UID Sand Tempered Plain	35	67	
94B.1.1.13	Shackle, Dog	1	41.3	
94B.1.1.14	Charcoal	40	6.7	
94B.1.2.1	Sherd, Deptford Simple Stamp	1	3.7	
94B.1.2.2	Flake tool, cortical and noncortical	3	20.7	
94B.1.2.3	Incomplete Blade	1	2.6	
94B.1.2.4	Whole flakes, cortical and noncortical	8	20.3	
94B.1.2.5	Incomplete flakes, cortical and noncortical	9	4.5	
94B.1.2.6	Fragmentary flakes, cortical and noncortical	8	3.5	
94B.1.2.7	Shatter	3	28.4	
94B.1.2.8	Shatter	3	71.9	
94B.1.1.1	Sherd, Wakulla Check Stamped	1	3.7	
94B.1.1.2	Sherd, Weeden Island Plain	1	14.4	
94B.1.1.3	Sherd, Untyped, Sand and Mica temper	2	11.8	
94B.1.1.4	Flake tool, noncortical	1	3.8	
94B.1.1.5	Core, bifacial, cortical	1	67.7	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.1.1.6	Whole flakes, cortical and noncortical	5	24.2	
94B.1.1.7	Incomplete flakes, cortical and noncortical	19	14	
94B.1.1.8	Fragmentary flakes, cortical and noncortical	21	23.4	
94B.1.1.9	Blade fragments, cortical and noncortical	2	1.2	
94B.1.1.10	Shatter, cortical and noncortical	4	6.8	
94B.1.1.11	Cobble, worked	1	73.1	
94B.1.1.12	Cobble	2	98.9	
94B.2.1.1	Sherd, Deptford Cross Simple Stamp	2	5.4	
94B.2.1.2	Incomplete flakes, noncortical	4	4	
94B.2.1.3	Whole flakes, cortical and noncortical	3	1.3	
94B.2.1.4	Shatter, cortical	1	0.5	
94B.2.1.5	Bone, mammal, Cranial	11	7	
94B.2.1.6	Shatter	2	11	
94B.2.2.1	Sherd, Deptford Cross Simple Stamp	22	69.7	
94B.2.2.2	Sherd, Deptford Linear Check Stamp	3	10.5	
94B.2.2.3	Sherd, Deptford Bold Check Stamp	1	1.9	
94B.2.2.4	Sherd, Fort Walton Plain	3	4.2	
94B.2.2.5	Sherd, Wakulla Check Stamp	2	3	
94B.2.2.6	Sherd, Untyped, Impressed	4	19.8	
94B.2.2.7	Sherd, Untyped, Sand Tempered	22	43	
94B.2.2.8	Sherd, Untyped, Sand and Grit Tempered	1	6	
94B.2.2.9	Sherd, Untyped, Sand Tempered	1	0.9	possible effigy vessel fragment
94B.2.2.10	Incomplete Blade, cortical and noncortical	3	2.7	
94B.2.2.11	Whole flakes, cortical and noncortical	14	20	
94B.2.2.12	Incomplete flakes, cortical and noncortical	23	19.4	
94B.2.2.13	Fragmentary flakes, cortical and noncortical	14	10.4	
94B.2.2.14	Shatter, cortical and noncortical	5	3.3	
94B.2.2.15	Shatter, cortical	13	39.9	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.2.2.16	Flake tool, Incomplete, cortical	1	6.7	
94B.2.2.17	Bone, mammal	2	5	
94B.2.2.18	Gaming piece	1	5.2	
94B.2.2.19	Seed	1	0.05	
94B.2.2.20	Charcoal	11	1.3	
94B.2.3.1	Flake tool	4	21.2	
94B.2.3.2	Biface, fragment	1	20.2	
94B.2.3.3	sherd, Deptford Linear Check Stamp	3	33.1	
94B.2.3.4	sherd, UID Sand Tempered Plain	2	7.4	
94B.2.3.5	Whole flakes, cortical and noncortical	3	3.2	
94B.2.3.6	Incomplete flakes, cortical and noncortical	9	5.6	
94B.2.3.7	Fragmentary flakes, cortical and noncortical	2	0.3	
94B.2.3.8	Shatter	5	33.6	
94B.3.1.1	Biface	1	6.6	
94B.3.1.2	Whole flakes, cortical and noncortical	2	2.1	
94B.3.1.3	Incomplete flakes, cortical and noncortical	7	11.5	
94B.3.1.4	Fragmentary flakes, cortical and noncortical	3	1.2	
94B.3.1.5	Unmodified Stone	2	0.8	
94B.3.1.6	Shatter	3	5.4	
94B.3.1.7	Charcoal	1	0.5	
94B.3.1.8	Pebble, heat-altered	1	45.2	
94B.3.2.1	Whole flakes, cortical and noncortical	4	63.6	
94B.3.2.2	Incomplete flakes, cortical and noncortical	8	11.1	
94B.3.2.3	Fragmentary flakes, cortical and noncortical	4	2.5	
94B.3.2.4	Shatter	6	30.9	
94B.3.2.5	Core, complete	1	132	
94B.3.2.6	Core, fragment	1	9.6	
94B.3.2.7	Cobble	10	1184.1	
94B.4.1.1	Sherd, Deptford Cross Simple Stamp	1	7	
94B.4.1.2	Whole flakes, cortical	1	0.8	
94B.4.1.3	Bone, mammal, Fossil	2	1.7	
94B.4.1.4	Cobble	2	29.4	
94B.4.1.5	core	1	56.1	
94B.4.1.6	shatter	32	37.6	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.4.1.7	Seed	1	0.1	
94B.5.1.1	Whole flakes, cortical and noncortical	1	0.2	
94B.5.1.2	Incomplete flakes, cortical and noncortical	2	2	
94B.5.1.3	Fragmentary flakes, cortical and noncortical	1	0.1	
94B.5.1.4	Charcoal	15	1.5	
94B.5.1.5	Shatter	1	36.4	
94B.5.2.1	Flake tool, cortical	1	10.8	
94B.5.2.2	Testudines	3	2.1	
94B.5.2.3	Scraper, Possible Hoe	1	732.6	
94B.6.1.1	Whole flake	1	195.4	
94B.6.1.2	Whole flake, cortical	1	5.9	
94B.6.1.3	Incomplete flakes, noncortical	1	0.1	
94B.6.1.4	shatter	1	0.7	
94B.6.1.5	charcoal	1	0.9	
94B.6.2.1	Projectile point	1	See Appendix B	
94B.6.2.2	Projectile point	1	See Appendix B	
94B.6.2.3	Whole flakes, cortical and noncortical	3	1.3	
94B.6.2.4	Incomplete flakes, cortical and noncortical	5	7.5	
94B.6.2.5	shatter	2	1.6	
94B.6.2.6	shatter	3	35.5	
94B.6.2.7	charcoal	1	0.6	
94B.7.1	Pin fragment	1	1	
94B.7.2	Testudines	11	15.4	
94B.7.3	Whole flakes, cortical and noncortical	1	4.3	
94B.7.4	Incomplete flakes, cortical and noncortical	1	0.5	
94B.7.5	Fragmentary flakes, cortical and noncortical	3	1.3	
94B.7.1.1	Fragmentary flakes, cortical and noncortical	3	1	
94B.7.1.2	UID	2	2	
94B.7.1.3	Cobble, burned	3	97.1	
94B.7.1.4	Cobble	12	315	
94B.7.1.5	Shatter	4	62.7	
94B.8.1.1	Flake tool, Side Scraper	1	2.8	
94B.8.1.2	Core, fragment	1	4.7	
94B.8.1.3	sherd, Deptford Simple Stamp	2	12.5	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.8.1.5	Incomplete flakes, cortical and noncortical	5	5.2	
94B.8.1.6	Fragmentary flakes, cortical and noncortical	9	2.8	
94B.8.1.7	sherd, UID Impressed	1	4.8	
94B.8.1.8	sherd, UID Sand tempered plain	6	9	
94B.8.1.9	Gastropod	1	0.1	
94B.8.1.10	Charcoal	12	2.9	
94B.8.1.11	Seed	1	0.4	
94B.8.1.12	shatter	3	2	
94B.8.1.13	shatter	8	30.1	
94B.8.2.1	Sherd, Deptford Cross Simple Stamp	32	356.7	
94B.8.2.2	Sherd, Untyped, Sand Tempered	14	28.1	
94B.8.2.3	Flake tool	2	8.1	
94B.8.2.4	Incomplete flakes	3	855.5	
94B.8.2.5	Charcoal	4	1.9	
94B.8.2.6	shatter	4	35.6	
94B.10.1	Sherd, Wakulla Check Stamped	1	6.9	
94B.10.2	Sherd, Untyped, Sand Tempered	1	8.5	
94B.10.3	Whole flakes, cortical and noncortical	4	33.6	
94B.10.4	Incomplete flakes, noncortical	1	0.3	
94B.10.5	Fragmentary flakes, noncortical	1	0.6	
94B.12.1.1	sherd, Untyped, Incised	1	1.5	
94B.12.1.2	sherd, Untyped, Sand tempered plain	2	2.4	
94B.12.1.3	Whole flakes, cortical and noncortical	5	2.8	
94B.12.1.4	Incomplete flakes, noncortical	4	7.1	
94B.12.1.5	Fragmentary flakes, noncortical	5	1.9	
94B.12.1.6	shatter	2	1.9	
94B.12.1.7	charcoal	50	3	
94B.12.2.1	Sherd, Deptford Bold Check Stamp	9	36.1	
94B.12.2.2	Sherd, Deptford Simple Stamp	7	23.7	
94B.12.2.3	Sherd, Untyped, Sand tempered plain	5	15.3	
94B.12.2.4	Blade, Complete	1	4.6	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.12.2.5	Whole flakes, cortical and noncortical	17	87.2	
94B.12.2.6	Incomplete flakes, noncortical	33	47.2	
94B.12.2.7	Fragmentary flakes, noncortical	34	18.1	
94B.12.2.8	Potlid	1	0.1	
94B.12.2.9	Shatter	6	7.9	
94B.12.2.10	charcoal	6	0.7	
94B.12.2.11	Shatter	6	26.8	
94B.12.2.12	Rock, Unmodified	2	23.1	
94B.13.1	Flake tool, cortical	1	39	
94B.13.2	Core, cortical and noncortical	2	48.9	
94B.13.3	Whole flakes, cortical and noncortical	9	32.8	
94B.13.4	Incomplete flakes, cortical and noncortical	10	59.7	
94B.13.5	Fragmentary flakes, cortical and noncortical	12	12.6	
94B.13.6	Shatter, cortical and noncortical	2	20	
94B.13.7	Pebbles	13	71	
94B.13.1.1	Sherd, Wakulla Check Stamped	2	3.5	
94B.13.1.2	Sherd, Deptford Linear Check Stamp	10	42.4	
94B.13.1.3	Sherd, Deptford Bold Check Stamp	1	11.4	
94B.13.1.4	Sherd, Untyped, Sand Tempered	9	22.1	
94B.13.1.5	Flake tool, noncortical	1	10.6	
94B.13.1.6	Whole flakes, cortical and noncortical	8	56	
94B.13.1.7	Incomplete flakes, cortical and noncortical	4	5.2	
94B.13.1.8	Fragmentary flakes, noncortical	4	3.5	
94B.13.1.9	shatter, noncortical	2	1	
94B.13.1.10	charcoal	2	0.5	
94B.13.2.1	Sherd, Deptford Bold Check Stamp	1	6.4	
94B.13.2.2	Sherd, Deptford Linear Check Stamp	32	133.6	
94B.13.2.3	Sherd, Deptford Cross Simple Stamp	7	28.6	
94B.13.2.4	Sherd, Untyped, Check Stamp	3	40.9	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.13.2.5	Sherd, Untyped, Sand Tempered	26	36	
94B.13.2.6	Fired Clay	1	22.5	
94B.13.2.7	PPK, Untyped	1	8.9	
94B.13.2.8	Endscraper	1	23.5	Patinated like from Early Archaic
94B.13.2.9	Drill tip	1	0.6	
94B.13.2.10	Flake tool, cortical and noncortical	3	26.8	
94B.13.2.11	Blade, Incomplete, noncortical	1	2.2	
94B.13.2.12	Whole flakes, cortical and noncortical	22	56.8	
94B.13.2.13	Incomplete flakes, cortical and noncortical	36	25.1	
94B.13.2.14	Fragmentary flakes, cortical and noncortical	37	19.3	
94B.13.2.15	Resharpener flake, PPK	1	0.2	
94B.13.2.16	shatter, noncortical	4	4.5	
94B.13.2.17	Pebble, unmodified	1	3.3	
94B.13.2.18	shatter	7	70.6	
94B.13.2.19	Plant remains	10	1.1	charcoal, nut shells
94B.14.1.1	Sherd, Wakulla Check Stamped	6	73.4	
94B.14.1.2	Sherd, Deptford Simple Stamp	4	13.3	1 bowl represented
94B.14.1.3	Sherd, Deptford Linear Check Stamp	3	13.3	
94B.14.1.4	Sherd, Untyped Fabric Marked, sand temper	1	24.8	1 bowl represented
94B.14.1.5	Sherd, Untyped Plain, Sand tempered	12	38.2	
94B.14.1.6	Biface fragment, noncortical	1	2.7	
94B.14.1.7	Flake tool, noncortical	2	0.6	
94B.14.1.8	Whole flakes, cortical and noncortical	23	21.2	
94B.14.1.9	Incomplete flakes, cortical and noncortical	25	15.8	
94B.14.1.10	Fragmentary flakes, cortical and noncortical	32	31.7	
94B.14.1.11	Shatter, cortical and noncortical	14	14.9	
94B.14.1.12	Shatter	5	6.4	
94B.14.2.1	Sherd, Deptford Cross Simple Stamp	10	104.8	
94B.14.2.2	Sherd, Deptford Check Stamp	8	33.1	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.14.2.3	Sherd, Untyped Plain, Sand tempered	6	21.3	
94B.14.2.4	Burin, noncortical	1	3.6	
94B.14.2.5	Uniface fragments, noncortical	4	3	
94B.14.2.6	Flake tool, noncortical	2	2.6	
94B.14.2.7	Flake tool, cortical	1	65.9	
94B.14.2.8	Blade fragment, noncortical	1	1.4	
94B.14.2.9	Core, cortical	1	292.4	
94B.14.2.10	Whole flakes, cortical and noncortical	42	61.1	
94B.14.2.11	Incomplete flakes, cortical and noncortical	58	57.9	
94B.14.2.12	Fragmentary flakes, cortical and noncortical	113	72.1	
94B.14.2.13	Shatter, cortical and noncortical	13	3.8	
94B.14.2.14	Shatter	12	58.9	
94B.15.1.1	Sherds, Deptford Cross Simple	20	230.2	1 bowl represented
94B.15.1.2	Sherd, Deptford Check Stamp	2	8.4	
94B.15.1.3	Sherd, Untyped, Sand Tempered	7	8.9	
94B.15.1.4	Uniface fragment, noncortical	1	16.3	
94B.15.1.5	Incomplete Blades, noncortical	3	8.1	
94B.15.1.6	Flake tool, noncortical	3	11.2	
94B.15.1.7	Flake tool fragments, noncortical	3	3.4	
94B.15.1.8	Whole flakes, cortical and noncortical	39	67.2	
94B.15.1.9	Incomplete flakes, cortical and noncortical	81	60.6	
94B.15.1.10	Fragmentary flakes, cortical and noncortical	86	55.2	
94B.15.1.11	shatter, cortical and noncortical	15	28.7	
94B.15.1.12	shatter	9	3.8	
94B.15.1.13	Pebble, unmodified	30	29.5	
94B.15.1.14	Charcoal	37	4	
94B.15.2.1	Sherd, Deptford Simple Stamp	8	54.7	
94B.15.2.2	Sherd, Deptford Check Stamp	13	45.6	
94B.15.2.3	Sherd, Untyped, Sand Tempered	2	4.1	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.15.2.4	Unifacial scraper	1	41.7	
94B.15.2.5	Unifacial scraper	1	116.6	
94B.15.2.6	Unifacial scraper	1	154.5	
94B.15.2.7	Flake tool, noncortical	6	47.2	
94B.15.2.8	Abrader	1	102	
94B.15.2.9	Preform, broken	1	72.3	
94B.15.2.10	Tool fragment	7	5.7	
94B.15.2.11	Whole flakes, cortical and noncortical	57	39.6	
94B.15.2.12	Incomplete flakes, cortical and noncortical	68	46.3	
94B.15.2.13	Fragmentary flakes, cortical and noncortical	76	37.7	
94B.15.2.14	Blade fragment	3	2.1	
94B.15.2.15	Shatter, cortical and noncortical	17	26.1	
94B.15.2.16	flakes	6	16.3	
94B.15.2.17	Charcoal	150	14.4	
94B.15.2.18	Pebble	3	1.3	
94B.15.2A.1	Sherds, Deptford Cross Simple	7	69.7	
94B.15.2A.2	Sherd, Deptford Bold Check Stamp	8	51.8	
94B.15.2A.3	Sherd, Untyped, Sand Tempered	8	15.2	
94B.15.2A.4	Biface, Untyped	2	35.8	
94B.15.2A.5	Flake tool, cortical and noncortical	7	51.6	
94B.15.2A.6	Whole flakes, cortical and noncortical	27	24.1	
94B.15.2A.7	Incomplete flakes, cortical and noncortical	57	26.8	
94B.15.2A.8	Fragmentary flakes, cortical and noncortical	66	28.2	
94B.15.2A.9	Incomplete Blade, noncortical	1	0.6	
94B.15.2A.10	Shatter, cortical and noncortical	8	3	
94B.15.2A.11	flake	5	23.6	
94B.15.2A.12	Charcoal	50	5	
94B.15.2A.13	Projectile point fragment, Untyped	1	0.5	
94B.15.3B.1	Whole flakes, cortical and noncortical	4	0.7	
94B.15.3B.2	Incomplete flakes, cortical and noncortical	10	3.6	
94B.15.3B.3	Fragmentary flakes, cortical and noncortical	4	1.3	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.15.3B.4	Unidentified artifact	1	0.3	
94B.15.3C.1	Flake tool, noncortical	1	0.1	
94B.15.3C.2	Flake tool, fragment	5	3.1	
94B.15.3C.3	Blade, fragment	1	1.4	
94B.15.3C.4	Whole flakes, cortical and noncortical	20	7.7	
94B.15.3C.5	Incomplete flakes, cortical and noncortical	40	12.8	
94B.15.3C.6	Fragmentary flakes, cortical and noncortical	36	9.3	
94B.15.3C.7	Shatter	3	1.3	
94B.15.3C.8	Flake	2	0.6	
94B.16.1.1	Sherd, Wakulla Check Stamp	1	2	
94B.16.1.2	Sherds, Deptford Cross Simple	5	35.9	
94B.16.1.3	Sherd, Deptford Simple Stamp	3	44.8	
94B.16.1.4	Sherd, Deptford Linear Check Stamp	3	23.7	one bowl represented
94B.16.1.5	Sherd, Untyped, Sand Tempered	3	12.2	
94B.16.1.6	Abrader	1	322.9	3 grooves
94B.16.1.7	Whole flakes, cortical and noncortical	1	0.5	
94B.16.1.8	Incomplete flakes, cortical and noncortical	26	17.4	
94B.16.1.9	Fragmentary flakes, cortical and noncortical	13	4.3	
94B.16.1.10	Shatter, cortical and noncortical	4	2.7	
94B.16.1.11	Shatter	5	16.1	
94B.16.1.12	Charcoal	20	1.9	
94B.16.2.1	sherd, Untyped Cob Mark	3	11.3	
94B.16.2.2	Sherd, Deptford Cross Simple	3	50.7	1 jar represented
94B.16.2.3	Sherd, Untyped, Sand Tempered	2	4.5	
94B.16.2.4	tool fragment	2	2	
94B.16.2.5	Flake tools, cortical and noncortical	3	37.9	
94B.16.2.6	Core, cortical	1	59.8	
94B.16.2.7	Hammerstone, cortical	1	84.3	core
94B.16.2.8	Whole flakes, cortical and noncortical	6	20.5	
94B.16.2.9	Incomplete flakes, cortical and noncortical	24	22.3	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
94B.16.2.10	Fragmentary flakes, cortical and noncortical	29	18.5	
94B.16.2.11	Blade tool	1	2.5	tip wear
94B.16.2.12	Shatter, cortical and noncortical	9	7.5	
94B.16.2.13	Cobble	1	31.3	
95A.1.2.1	Blade, Incomplete	1	0.9	
95A.1.2.2	Flake tool	1	1.1	
95A.1.2.3	Incomplete flakes, cortical and noncortical	3	1.4	
95A.1.2.4	Shatter	1	2.2	
95A.1.2.5	Unmodified Stone	4	7.8	
95A.1.3.1	Sherd, Untyped, Sand tempered plain	2	7.6	
95A.1.3.2	Whole flakes, cortical and noncortical	1	0.1	
95A.1.3.3	Incomplete flakes, cortical and noncortical	3	1.7	
95A.1.3.4	Fragmentary flakes, cortical and noncortical	3	0.8	
95A.2.1.1	Sherd, Lake Jackson Plain	1	6.7	
95A.2.1.2	Flake tool, fragment	1	1.4	
95A.2.1.3	Whole flakes, cortical and noncortical	7	2.2	
95A.2.1.4	Incomplete flakes, cortical and noncortical	13	7	
95A.2.1.5	Fragmentary flakes, cortical and noncortical	15	5.1	
95A.2.1.6	Shatter	13	12.1	
95A.2.1.7	Unmodified stone	1	0.2	
95A.2.2.1	Sherd, Untyped, Sand tempered plain	2	3.3	
95A.2.2.2	Whole flakes, cortical and noncortical	2	0.3	
95A.2.2.3	Incomplete flakes, cortical and noncortical	5	2.8	
95A.2.2.4	Fragmentary flakes, cortical and noncortical	7	3.7	
95A.2.2.5	Shatter	6	2.2	
95A.2.2.6	Unmodified stone	1	0.6	
95A.2.3.1	Sherd, Untyped, Sand tempered plain	2	0.7	
95A.2.3.2	Blade, Incomplete	1	0.5	
95A.2.3.3	Biface, Fragment	1	2.1	
95A.2.3.4	Flake tool, Fragment	1	2.2	
95A.2.3.5	Whole flakes, cortical and noncortical	15	3.1	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95A.2.3.6	Incomplete flakes, cortical and noncortical	16	9.1	
95A.2.3.7	Fragmentary flakes, cortical and noncortical	48	14.6	
95A.2.3.8	Shatter	25	19.7	
95A.2.3.9	Flakes	6	2.4	
95A.2.4.1	Blade, Utilized	1	1.9	
95A.2.4.2	Flake tool, Fragment	2	4.7	
95A.2.4.3	Whole flakes, cortical and noncortical	11	5.3	
95A.2.4.4	Incomplete flakes, cortical and noncortical	13	12.7	
95A.2.4.5	Fragmentary flakes, cortical and noncortical	16	5.5	
95A.2.4.6	Shatter	5	3.2	
95A.2.4.7	Flake	1	1.8	
95A.2.4.8	Sherds, Untyped, Sand tempered plain	12	4.4	
95A.2.6.1	Sherd, Deptford Simple Stamp	1	11.6	
95A.2.6.2	Sherd, Impressed Rim, Untyped, Sand tempered plain	1	6.5	
95A.2.6.3	Sherds, Untyped, Sand tempered plain	19	31.4	
95A.2.6.4	Blade tool	1	3.4	
95A.2.6.5	Whole flakes, cortical and noncortical	11	8.6	
95A.2.6.6	Incomplete flakes, cortical and noncortical	12	16.6	
95A.2.6.7	Fragmentary flakes, cortical and noncortical	16	13.5	
95A.2.6.8	Shatter	5	1.8	
95A.2.7.1	Sherds, Untyped, Sand tempered plain	1	1.5	
95A.2.7.2	Biface, Tip	1	0.2	
95A.2.7.3	Whole flakes, cortical and noncortical	16	12.9	
95A.2.7.4	Incomplete flakes, cortical and noncortical	21	3.1	
95A.2.7.5	Core, Fragment	1	11.2	
95A.2.7.6	Shatter	6	6.9	
95A.2.8.1	Sherds, Untyped, Sand tempered plain	55	123.4	
95A.2.8.2	Sherds, Untyped, Sand tempered plain smoothed	1	2.2	
95A.2.8.3	Rock, Unmodified	5	52.8	
95A.2.8.4	Flake tool, Fragment	2	14.2	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95A.2.8.5	Blade, Fragment	2	4.1	
95A.2.8.6	Whole flakes, cortical and noncortical	15	16.8	
95A.2.8.7	Incomplete flakes, cortical and noncortical	21	20.2	
95A.2.8.8	Fragmentary flakes, cortical and noncortical	44	10.6	
95A.2.8.9	Shatter	7	5.8	
95A.2.8.10	Sherds	1	57.4	Conglomerate
95A.2.9.1	Sherds, Deptford Cross Simple Stamp	2	9.9	
95A.2.9.2	Sherds, Untyped, Sand tempered plain	12	12.9	
95A.2.9.3	Blade tool, Incomplete	1	2.1	
95A.2.9.4	Whole flakes, cortical and noncortical	7	2.4	
95A.2.9.5	Incomplete flakes, cortical and noncortical	8	7	
95A.2.9.6	Fragmentary flakes, cortical and noncortical	4	0.7	
95A.2.10.1	Whole flakes, cortical and noncortical	6	2	
95A.2.10.2	Incomplete flakes, cortical and noncortical	5	2.9	
95A.2.10.3	Fragmentary flakes, cortical and noncortical	5	0.7	
95A.2.10.4	Shatter	1	1.3	
95A.2.10.5	Sherds, Untyped, Sand tempered plain	1	0.6	
95A.2.11.1	Sherds, Untyped, Sand tempered plain	17	17.3	
95A.2.11.2	Whole flakes, cortical and noncortical	6	7.3	
95A.2.11.3	Incomplete flakes, cortical and noncortical	5	3.5	
95A.2.11.4	Fragmentary flakes, cortical and noncortical	18	3.7	
95A.2.11.5	Flake	1	1.1	
95A.2.11.6	Fossil endocast	1	1	
95A.2.11.7	Shatter	3	1.4	
95A.3.1.1	Incomplete flakes, cortical and noncortical	1	1.3	
95A.3.2.1	Incomplete flakes, cortical and noncortical	2	0.4	
95A.3.2.2	Flake	1	2.3	
95A.4.1.1	Incomplete flakes, cortical and noncortical	6	9.9	
95A.4.1.2	Fragmentary flakes, cortical and noncortical	3	1.5	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95A.4.1.3	Seeds, Taxodium	5	0.6	
95A.4.1.4	Fossil	2	0.9	
95A.4.1.5	Sherds, Untyped, Sand tempered plain	2	2.1	
95E.1.1	Flake, Unmodified, Secondary	1	5.9	
95E.2.1	Tools	1	not weighed	weathered
95E.3.1	Sherds, Deptford Cross Simple	2	19.2	
95E.3.2	Preform	1	21.5	
95E.3.3	Side scraper fragment	1	8.9	heat shattered
95E.3.4	Flake, Unmodified, Abrader (?)	1	12.4	black chert
95E.3.5	Flake, Unmodified	2	9	possible bola stone flakes
95E.3.6	Flake, Unmodified	1	36.5	
95E.3.7	Flake, Unmodified, noncortical	7	56.1	
95E.3.8	Flake, Unmodified, cortical	10	81.6	
95E.3.9	scraper, end, cortical	1	424.4	large tabular
95E.3.10	Flake, Unmodified, cortical	1	60.5	possible bola stone flakes
95E.3.11	Core	1	108.5	
95E.3.12	Flake, Unmodified, cortical	1	279	
95E.4	NOT USED			
95E.5.1	Core, noncortical	1	44.2	heat shattered
95E.5.2	Flake, Unmodified, noncortical	1	17.5	
95E.5.3	Flake, Unmodified, cortical	3	36.7	
95E.6.1	flake tool, cortical	2	42.8	
95E.6.2	Abrader	1	435.2	Possible Mano
95E.7.1	flake tool, noncortical	1	23.6	heavy scraper wear
95E.8.1	Flake, Unmodified, cortical	1	10.7	light gray
95E.9	NOT USED			
95E.10.1	Soil Sample	2	not weighed	Vials
95E.11.1	Tools	2	22.7	dark gray, possible abraders
95E.11.2	Cobble	1	231.4	medium tan, possible bola stone
95E.11.3	Cobble	3	147.3	
95E.11.4	Flake, Unmodified	3	28.8	
95E.11.5	Pebble	15	80	
95E.12.1	Sample	1	not weighed	Vial

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.13.1	Flake, Unmodified, cortical	1	11.9	
95E.14.1	Flake, Unmodified, cortical	1	14.2	
95E.14.2	Coprolite	1	0.2	Species unknown
95E.14.3	Pebble	1	0.2	
95E.15.1	Beveled Kirk, noncortical	1	See Appendix B	light gray
95E.16.1	Bone	1	not weighed	turtle and fish
95E.17.1	Beveled Kirk	1	not weighed	black
95E.18.1	Beveled Kirk	1	not weighed	black
95E.19.1	Flake, Unmodified, noncortical	2	7.8	
95E.19.2	Abrader	2	201.6	
95E.20.1	Preform, noncortical	1	65.6	Appears to have some scraper wear
95E.21.1	Flake, Unmodified, noncortical	1	3.9	
95E.22.1	Flake, Unmodified, noncortical	1	2.9	
95E.22.2	Cobble	1	239.4	possible bola stone preform
95E.23.1	Flake, Unmodified, noncortical	1	14.1	
95E.23.2	Flake, Unmodified, noncortical	1	11.5	
95E.23.3	Shatter, cortical	1	134.8	
95E.24.1	Assorted	1	not weighed	dolomite, wood, bone
95E.25.1	Assorted	1	not weighed	dolomite, wood, bone
95E.26.1	Biface fragment, cortical	1	15.9	black patina
95E.27.1	Seed	1	not weighed	hickory nut (dated)
95E.28.1	Flake, Unmodified, noncortical	1	5	
95E.28.2	Charcoal	3	0.5	
95E.29.1	Soil Sample	1	not weighed	dated
95E.30.1	flake tool, cortical	1	24.3	
95E.30.2	Flake, Unmodified, cortical	1	36.1	Possible Bola Stone Fragment
95E.30.3	Flake, Unmodified, noncortical	2	8.1	
95E.30.4	Shatter, cortical	1	9.3	
95E.31.1	Biface fragment, cortical	1	18.5	
95E.31.2	Flake, Unmodified, noncortical	2	7.4	
95E.31.3	Cobble	1	627.6	
95E.31.4	Abrader	7	329.7	

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.31.5	Flake, Unmodified, cortical	1	13.9	
95E.31.6	Flake, Unmodified, cortical	2	63.9	low grade
95E.31.7	Cobble	1	183.5	
95E.31.8	Shatter, cortical	2	43.9	
95E.31.9	core tool, cortical	1	103.7	
95E.31.10	Biface fragment, noncortical	1	7.2	
95E.31.11	flake tool, noncortical	3	4.6	
95E.31.12	Flake, Unmodified, noncortical	2	9	
95E.31.13	Flake, Unmodified, noncortical	1	1.6	heat shattered
95E.31.14	Flake, Unmodified, cortical	5	5.8	
95E.31.15	Flake, Unmodified, noncortical	4	1.2	resharpening
95E.32.1	Sample	1	not weighed	
95E.33.1	Sample	1	not weighed	
95E.34.1	Abrader	1	71.4	
95E.35.3	Sample	1	not weighed	
95E.36.1	flake tool, cortical	1	5.6	
95E.37.1	Cobble	1	not weighed	O1
95E.38.1	Cobble	1	47.4	O2
95E.39.1	Cobble	1	not weighed	O3
95E.40.1	Cobble	1	not weighed	O4
95E.41.1	Cobble	1 BAG	not weighed	O5
95E.42.1	Cobble	1 BAG	not weighed	O8
95E.43.1	Cobble	1 BAG	not weighed	O10
95E.44.1	Cobble	1 BAG	not weighed	O11
95E.45.1	Cobble	1 BAG	not weighed	O12
95E.46.1	Cobble	1 BAG	not weighed	O13
95E.47.1	Cobble	1 BAG	not weighed	O14
95E.48.1	Flake, Unmodified, Possible Bola Stone Fragment	1	15.3	O16
95E.49.1	Cobble	1 BAG	not weighed	O17
95E.50.1	Cobble	1 BAG	not weighed	O18
95E.51.1	Cobble	1 BAG	not weighed	O19
95E.52.1	Cobble	1 BAG	not weighed	O21
95E.53.1	Cobble	1 BAG	not weighed	O22
95E.54.1	Cobble	1 BAG	not weighed	O24
95E.55.1	Cobble	1 BAG	not weighed	O25
95E.56.1	Cobble	1 BAG	not weighed	O26
95E.57.1	Wood	1 BAG	not weighed	O27

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.58.1	Cobble	1 BAG	not weighed	O28
95E.59.1	Wood	1 BAG	not weighed	O29
95E.60.1	Cobble	1 BAG	not weighed	O30
95E.61.1	Wood	1 BAG	not weighed	O31
95E.62.1	Cobble	1 BAG	not weighed	O32
95E.63.1	Cobble	1 BAG	not weighed	O33
95E.64.1	Cobble	1 BAG	not weighed	O36
95E.65.1	Flake tool, Cortical	1	36.5	
95E.66.1	Charcoal, Cobbles	1 BAG	not weighed	
95E.67.1	Cobble	1 BAG	not weighed	O20
95E.68.1	Fossil Rib	1 BAG	not weighed	P1
95E.69.1	Cobble	1 BAG	not weighed	P2
95E.70.1	Flake	1	39.3	P4
95E.71.1	Cobble	1 BAG	not weighed	P5
95E.72.1	Wood	1 BAG	not weighed	P7
95E.73.1	Cobble	1 BAG	not weighed	P8
95E.74.1	Cobble	1 BAG	not weighed	P9
95E.75.1	Cobble	1 BAG	not weighed	P10
95E.76.1	Cobble	1 BAG	not weighed	P11
95E.77.1	Wood	1 BAG	not weighed	P12
95E.78.1	Wood	1 BAG	not weighed	P13
95E.79.1	Cobble	1 BAG	not weighed	P14
95E.80.1	Charcoal	1 BAG	not weighed	P16
95E.81.1	Cobble	1 BAG	not weighed	P17
95E.82.1	Wood	1 BAG	not weighed	P19
95E.83.1	Cobble	1 BAG	not weighed	P40
95E.84.1	abrader, multiple wear facets	1	53.4	P41
95E.85.1	Cobble	1 BAG	not weighed	P42
95E.86.1	Cobble	1 BAG	not weighed	P43
95E.87.1	Cobble	1 BAG	not weighed	P44
95E.88.1	Charcoal, In Hearth bottom	1 BAG	not weighed	P45
95E.89.1	Cobble	1 BAG	not weighed	P46
95E.90.1	Bola stone fragment, Cortical	1	97.4	P47
95E.90.2	Flake, Unmodified	1	111.4	P47
95E.90.3	Cobble	1	37.1	P47
95E.91.1	Cobble	1 BAG	not weighed	P50
95E.92.1	Cobble	1 BAG	not weighed	P, GSC
95E.93.1	Flake, Unmodified, Secondary	1	25.5	Q1
95E.94.1	Flake, Unmodified, Secondary	1	8	Q2
95E.95.1	Bola stone fragment	1	68.8	Q4

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.96.1	Cobble	1 BAG	not weighed	Q5
95E.97.1	Cobble	1 BAG	not weighed	Q6
95E.98.1	Cobble	1 BAG	not weighed	Q7
95E.99.1	Cobble	1 BAG	not weighed	Q8
95E.100.1	Cobble	1 BAG	not weighed	Q10
95E.101.1	Cobble	1 BAG	not weighed	Q11
95E.102.1	Cobble	1 BAG	not weighed	Q12
95E.103.1	turtle, plastron	1	25.7	Q16
95E.104.1	Wood	1 BAG	not weighed	Q18
95E.105.1	Cobble	1 BAG	not weighed	Q19
95E.106.1	Cobble	1 BAG	not weighed	Q20
95E.107.1	Cobble	1	44.1	Q40
95E.108.1	Cobble	1 BAG	not weighed	Q41
95E.109.1	Cobble	1 BAG	not weighed	Q42
95E.110.1	Preform	1	43.3	Q43
95E.111.1	Wood, cobbles	2 BAGS	not weighed	Q48
95E.112.1	Flake, Unmodified, Cortical	1	12.7	Q49
95E.113.1	Cobble	1 BAG	not weighed	Q50
95E.114.1	Wood, cobbles	2 BAGS	not weighed	MAP
95E.115.1	Wood, cobbles	3 BAGS	not weighed	Q
95E.116.1	Cobble	1 BAG	not weighed	T1
95E.117.1	Cobble	1 BAG	not weighed	T2
95E.118.1	Cobble	1 BAG	not weighed	T3
95E.119.1	Cobble	1 BAG	not weighed	T4
95E.120.1	Bone, plastron	1 BAG	not weighed	T5
95E.121.1	Cobble	1 BAG	not weighed	T6
95E.122.1	Cobble	1 BAG	not weighed	T7
95E.123.1	Cobble	1 BAG	not weighed	T9
95E.124.1	Cobble	1 BAG	not weighed	T11
95E.125.1	Cobble	1 BAG	not weighed	T10
95E.126.1	Cobble	1 BAG	not weighed	T13
95E.127.1	Wood	1 BAG	not weighed	T14
95E.128.1	Cobble	1 BAG	not weighed	T15
95E.129.1	Cobble	1 BAG	not weighed	T17
95E.130.1	Wood	1 BAG	not weighed	T18
95E.131.1	Cobble	1 BAG	not weighed	T19
95E.132.1	Wood	1 BAG	not weighed	T20
95E.133.1	Charcoal	1 BAG	not weighed	T21
95E.134.1	Cobble	1 BAG	not weighed	T24, T25
95E.135.1	Wood	1 BAG	not weighed	T27
95E.136.1	Cobble	1 BAG	not weighed	T28
95E.137.1	Wood	1 BAG	not weighed	T29

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.138.1	Cobble	1 BAG	not weighed	T30
95E.139.1	Charcoal	1 BAG	not weighed	T32
95E.140.1	Flake, Unmodified, Possible abrader	1	135.9	T33
95E.141.1	Cobble	1	444.8	T34
95E.142.1	Cobble	1 BAG	not weighed	T35
95E.143.1	Cobble	1 BAG	not weighed	T37
95E.144.1	Cobble	1 BAG	not weighed	T
95E.145.1	Cobble	1 BAG	not weighed	U1
95E.146.1	Wood	1 BAG	not weighed	U3
95E.147.1	Cobble	1 BAG	not weighed	U4
95E.148.1	Wood, cobbles	1 BAG	not weighed	U5
95E.149.1	Shatter	1	82.7	U6
95E.150.1	Wood	1 BAG	not weighed	U8
95E.151.1	Cobble	1 BAG	not weighed	U12
95E.152.1	Cobble	1 BAG	not weighed	U14
95E.153.1	Cobble	1 BAG	not weighed	U15
95E.154.1	Cobble	1 BAG	not weighed	U16
95E.155.1	Cobble	1 BAG	not weighed	U17
95E.156.1	Cobble	1 BAG	not weighed	U18
95E.157.1	Flake, Unmodified	1	29.3	U19
95E.158.1	Cobble	1 BAG	not weighed	U20
95E.159.1	Cobble	1 BAG	not weighed	U21
95E.160.1	Cobble	1 BAG	not weighed	U22
95E.161.1	Wood	1 BAG	not weighed	U23
95E.162.1	Cobble	1 BAG	not weighed	U24
95E.163.1	Cobble	1 BAG	not weighed	U25
95E.164.1	Cobble	1 BAG	not weighed	U27
95E.165.1	Cobble	1 BAG	not weighed	U28
95E.166.1	Cobble	1 BAG	not weighed	U30
95E.167.1	Cobble	1 BAG	not weighed	U31
95E.168.1	Cobble	1 BAG	not weighed	U32
95E.169.1	Cobble	1 BAG	not weighed	U33
95E.170.1	Cobble	1 BAG	not weighed	MAP
95E.171.1	Wood	1 BAG	not weighed	U9, U7
95E.172.1	Cobble	1 BAG	not weighed	CSC
95E.173.1	Cobble	1 BAG	not weighed	CSC
95E.174.1	Wood, cobbles	1 BAG	not weighed	CSC
95E.175.1	Cobble	1 BAG	not weighed	V4
95E.176.1	Cobble	1 BAG	not weighed	V5
95E.177.1	Cobble	1 BAG	not weighed	V7
95E.178.1	Cobble	1 BAG	not weighed	V9
95E.179.1	Cobble	1 BAG	not weighed	V13

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.180.1	Cobble	1 BAG	not weighed	V15
95E.181.1	Cobble	1 BAG	not weighed	V16
95E.182.1	Cobble	1 BAG	not weighed	V17
95E.183.1	Wood, cobbles	1 BAG	not weighed	V19
95E.184.1	Cobble	1 BAG	not weighed	V20
95E.185.1	Cobble	1 BAG	not weighed	V21
95E.186.1	Cobble	1 BAG	not weighed	V22
95E.187.1	Wood, cobbles	1 BAG	not weighed	V8
95E.188.1	Cobble	1 BAG	not weighed	V24
95E.189.1	Cobble	1 BAG	not weighed	V25
95E.190.1	Cobble	1 BAG	not weighed	V26
95E.191.1	Cobble	1 BAG	not weighed	V27
95E.192.1	Cobble	1 BAG	not weighed	V28
95E.193.1	Cobble	1 BAG	not weighed	V29
95E.194.1	Cobble	1 BAG	not weighed	V30, V36
95E.195.1	Cobble	1 BAG	not weighed	V31
95E.196.1	Cobble	1 BAG	not weighed	V32
95E.197.1	Wood, post diameter	1 BAG	not weighed	V33
95E.198.1	Cobble	1 BAG	not weighed	V34
95E.199.1	Cobble	1 BAG	not weighed	V37
95E.200.1	Cobble	1 BAG	not weighed	MAP
95E.201.1	Cobble	1 BAG	not weighed	V
95E.202.1	Soil Sample 1	1 BAG	not weighed	PROFILE
95E.203.1	Soil Sample 2	1 BAG	not weighed	PROFILE
95E.204.1	Soil Sample 3	1 BAG	not weighed	PROFILE
95E.205.1	Soil Sample 4	1 BAG	not weighed	PROFILE
95E.206.1	Soil Sample 5	1 BAG	not weighed	PROFILE
95E.207.1	Soil Sample 6	1 BAG	not weighed	PROFILE
95E.208.1	Flake	1 BAG	not weighed	T
95E.209.1	Flake	1 BAG	not weighed	I
95E.210.1	MISSING	1 BAG	not weighed	K
95E.211.1	Wood, "Canoe"	1 BAG	not weighed	Multiple
95E.212.1	Wood, Oak log to Stahle	1 BAG	not weighed	C
95E.213.1	Wood	1 BAG	not weighed	I1
95E.214.1	Wood, cobbles	1 BAG	not weighed	I2
95E.215.1	Core, Cortical	1	155	I3
95E.216.1	Wood, cobbles	1 BAG	not weighed	I4
95E.217.1	Wood	1 BAG	not weighed	I5
95E.218.1	Cobble	1 BAG	not weighed	I6
95E.219.1	Cobble	1 BAG	not weighed	I7
95E.220.1	Charcoal	1 BAG	not weighed	I8
95E.221.1	Cobble	1 BAG	not weighed	I9
95E.222.1	Wood	1 BAG	not weighed	I10

Field Specimen and Lot	Description	Count or Quantity	Weight	Comments
95E.223.1	Cobble	1 BAG	not weighed	I11
95E.224.1	Cobble	1 BAG	not weighed	I12
95E.225.1	Wood	1 BAG	not weighed	I15
95E.226.1	Cobble	1 BAG	not weighed	I16
95E.227.1	Cobble	1 BAG	not weighed	I17
95E.228.1	Cobble	1 BAG	not weighed	I18
95E.229.1	Cobble	1 BAG	not weighed	I19
95E.230.1	Soil Sample	1 BAG	not weighed	UNIT 6
95E.231.1	Soil Sample	1 BAG	not weighed	I, H, C
95E.232.1	Soil Sample	1 BAG	not weighed	O
95E.233.1	Soil Sample	1 BAG	not weighed	O, P
95E.234.1	Soil Sample	1 BAG	not weighed	P, Q
95E.235.1	Soil Sample	1 BAG	not weighed	V
95E.236.1	Soil Sample	1 BAG	not weighed	T
95E.237.1	Antler, Deer	1 BAG	not weighed	U
95E.238.1	Antler, with callote, Deer	1 BAG	not weighed	S
95E.239.1	Cobble	1 BAG	not weighed	I
95E.240.1	Flake, Unmodified, Cortical	1	17.9	C
95E.241.1	Bolen point, Impact Fractured	1 BAG	not weighed	C
95E.242.1	Preform, Noncortical	1	21.8	C
95E.243.1	Flake tool, Cortical	1	12.5	U
95E.243.2	Seed husk	1	1	U
95E.244.1	Core, Noncortical	1	72.8	GSC
95E.245.1	Wood, cobbles	1 BAG	not weighed	GSC
95E.246.1	Core, Noncortical	1	68.5	Black patina over Light Gray chert

APPENDIX B
EARLY ARCHAIC POINT MEASUREMENTS

Specimen Number	Length	Width	Thick	Shoulder Width	Stem Width	Base Width	WT
95E-241	86	35.2	7.8	33.3	15.2	29.2	21.4
8Jel21-Area 7S	58.1	20.6	8.2	20.6	14.3	19.8	7.5
8Jel21-Unit36-	38.3	29.5	7.5	29.5	14.5	22	6.2
8Jel21-Unit	36.2	25	6.9	25	14.7	23.4	6
95E-15	60.8	32.4	8.8	32.4	17.8	25.9	14.3
8Jel21-Area 15	44.4	22.5	6.8	21.1	14	22.5	6
8Jel21-Area 5	52.3	35.1	8.9	35.1	17.9	23.7	11.3
8Jel21-Area 1	44.4	22.6	7	22.6	14.9	20.6	8.6
8Jel21-Area	36.9	31.9	7.5	31.9	18.3	24.6	6.9
95E-17	47	41.1	8	41.1	18.4	25.5	12
8Jel21-Unit	34.5	25.5	7.1	24.1	15.1	25.5	5.4
8Jel21-Area	53.8	26.6	7.1	26.6	15.2	22.7	8.2
8Jel21-Area 9P	38.8	25.6	6.6	25.6	16.7	25.1	6.3
8Jel21-Unit	46.3	39.1	9	39.1	15.5	0	10.3
8Jel21-Unit	53.7	30.3	6.7	30.3	15.6	25.4	8.8
8Jel21-SE of	47.5	25.7	7.4	25.7	16.5	24.5	12
8Jel21-Unit	65.7	32.3	6.4	32.3	15.6	17.5	11.3
95E-18	40.8	24.3	6.8	24.3	12.3	22.1	4.8
8Jel21-NE or	79.9	32.3	5.3	30.2	16.4	26.2	16.2
8Jel21-Area 1	26.1	13.9	2.3	26.1	8.2	11.5	1
8Jel21-Area 8E	60.3	28.6	7.1	27.3	11.5	17	11.6
8Jel21-Area 1C	63.4	25.9	7.7	24.6	16.4	25.9	12.7
2000-20-2-193	52.3	34	6.1	34	17.1	23	9
2000-20-2-237	53.4	32.1	7.6	31.7	17.2	22.7	11.1
2000-20-2-217	57.8	28.9	7.8	28.9	17.2	23.4	10.5
2000-20-2-223	76.7	29.2	7	29.2	16.3	22.2	18.1
2000-20-2-191	35.8	24.1	5.1	24.1	17.3	24.2	4.9
2000-20-2-228	44.7	27.8	8.1	27.8	16.3	26.2	8
2000-20-1-336	49.2	29.4	7.2	29.6	17.3	26.2	9.7
2000-20-1-293	60.7	27.1	8.8	27.1	16.2	0	12.2
2000-20-1-353	68.3	28.5	9.1	27.5	16.3	24.4	16.8
2000-20-2-190	62.9	35.9	8	35.9	16.7	21.9	17.1
2000-20-2-210	67.6	25.5	7.6	25.5	17	24.1	14.6
2000-20-2-343	61.8	36.8	7.9	36.8	16.4	23.4	16.2
2000-20-2-231	46.5	30.6	6.9	30.6	17	27.1	9.1
2000-20-1-357	41.6	32.2	6.2	32.2	16.8	27.1	7.2
2000-20-2-196	53.5	31.6	8.1	31.6	16.8	27.4	11
2000-20-2-125	43.6	28.7	6.6	43.6	17.4	23	8.5
2000-20-1-318	63.7	28	8.5	28	17.5	28.1	12.8
2000-20-2-220	43.9	29.2	5.7	29.2	16.6	26.8	6.5
2000-20-2-197	56.3	29.5	7	29.5	16.5	22.4	9.6
2000-20-2-233	66.8	28.5	7.7	28.5	16.4	27.5	13.6
2000-20-2-022	94	29.1	7.8	29.1	17	26.8	21.2
2000-20-2-128	54.4	43.5	8.2	43.5	21	0	15.4

Specimen Number	Length	Width	Thick	Shoulder Width	Stem Width	Base Width	WT
2000-20-1-362	53.7	37.4	8.7	37.4	19.2	27.2	15.4
2000-20-1-355	53.5	38.4	7.7	38.4	19.4	26.8	12.7
2000-20-1-352	76	31.5	8.6	31.5	19.4	23	21.9
2000-20-2-227	56.6	34.5	6.1	34.5	19.8	27.1	12.2
2000-20-2-124	47.6	22.3	9.2	22.1	19.8	22.3	10.1
2000-20-1-360	77.2	38.6	8.4	38.6	20	29.1	27.6
2000-20-1-363	72.9	34.4	7.5	34.4	17.5	25.2	17.8
2000-20-2-230	76.8	27.7	9	24	20.7	27.7	16.6
2000-20-2-120	65.8	40	9.5	34.6	19	23.8	26.9
2000-20-2-280	77.3	42.7	8.8	42.7	21.7	29.4	25.2
2000-20-2-349	68.7	31.1	8.4	31.1	22.1	29.7	16
2000-20-1-286	45	28.1	6.4	26.6	22.3	28.2	7.4
2000-20-2-226	55.3	30.9	7.9	30.9	22.5	30.9	13.3
2000-20-1-361	56.7	35.5	9.6	35.5	22.5	30.3	15.9
2000-20-1-291	47.6	27.7	7.5	27.7	22.8	24.9	9.1
2000-20-2-225	68.1	28.3	10.2	28.3	20.3	26	17.2
2000-20-1-348	71.6	28.4	8	28.4	18.1	27	15.8
2000-20-1-335	49	26.9	7.1	26.9	16.2	26.9	8.2
2000-20-1-349	73.4	27.6	7.9	27.3	17.5	28	15.4
2000-20-1-325	42.3	32.1	5.9	26.6	15.8	32.1	5.6
2000-20-2-349	49.7	36.6	8.6	36.6	17.7	29.3	14.7
2000-20-2-192	56.4	31.2	7.1	31.2	17.8	23.9	11.7
2000-20-2-346	73	28.7	8.7	28.1	18	28.7	15.4
2000-20-1-364	60.9	38.3	8.4	38.3	19.2	27.9	17
2000-20-1-358	63.1	33.7	8	33.7	18	26.1	15.3
2000-20-2-222	62.3	32.3	8.7	32.3	19.1	29	17.2
2000-20-1-354	67	30.8	8	29.2	18.2	26.1	15.6
2000-20-1-365	69.6	29.1	7.5	29.1	18.4	24.9	13.5
2000-20-2-341	87.9	32.5	7.9	32.5	18.6	26.1	21.7
2000-20-2-203	81.7	24.8	7.4	24.8	18.6	27.4	15.9
2000-20-2-188	47.2	37	6.9	37	18.6	12.8	10.9
2000-20-1-356	51	36.1	7.4	36.1	18.6	26.5	11.8
2000-20-1-332	43.2	25.4	6.7	22.7	17.4	25.4	5.6
2000-20-1-359	58.3	32.4	8.9	31.4	18	24.9	14.1
2000-20-2-210	52.7	27.1	6.8	27.1	13.5	26.5	8.9
2000-20-1-320	41.7	27	6.4	27	15.9	26.7	6.5
2000-20-2-181	43.9	30.2	6.8	30.2	13.1	22.4	8.2
2000-20-1-327	51	26.5	8.8	26.5	13.1	22.2	7.9
2000-20-2-184	65.9	27.3	8	26.9	13.3	21.7	12.8
8Jel21-Ohmes	53.9	29.4	7.7	29.4	13.4	21.1	11.1
2000-20-2-207	58.4	29.4	6.5	29.4	13	22.7	9.5
2000-20-1-330	42	26.4	6	26.4	13.4	24.7	6.4
2000-20-1-331	45.9	25.4	6.7	25.4	12.8	22.8	6
2000-20-2-183	45.4	28.4	7	28.4	13.5	22.1	7.8
2000-20-2-200	36.6	22.2	8.9	21.2	13.6	22.2	5.5
2000-20-1-322	46.5	22.8	7.6	21.6	13.6	23.4	5.7

Specimen Number	Length	Width	Thick	Shoulder Width	Stem Width	Base Width	WT
2000-20-2-195	66.2	26.1	7	25.1	13.7	26.1	10.5
2000-20-1-323	36.5	22.9	7.1	22.9	13.7	18.5	4.3
2000-20-2-198	51.9	25	7.5	25	13.8	22.4	9.3
2000-20-2-205	46.1	25.4	6.7	25.4	13.4	24.1	6.7
2000-20-2-344	51.6	30.2	7	30.2	12	21	10.3
2000-20-2-178	56.5	35.7	4.6	24.8	8.3	9.4	10.6
2000-20-2-204	80.6	29.1	8.2	29	10.7	20.1	17.2
2000-20-2-235	46.1	25	6.8	24.8	11.3	17	7.2
2000-20-2-234	36	26.5	7.5	26.5	11.4	19.7	6
2000-20-1-328	53.3	19.7	7.6	18.5	11.5	19.7	6
2000-20-2-213	42.1	25	7.1	25	13.1	21.3	6.8
2000-20-1-326	40.1	21.7	6.1	21.6	11.7	19.3	4.5
2000-20-2-221	42.4	24.2	6.8	24.2	14	25.4	8.7
2000-20-2-218	32.6	27.9	7.8	27.9	12.2	20.5	6.1
2000-20-2-340	47.5	30.3	7	30.3	12.3	16.4	7.8
2000-20-2-238	46.6	25.2	5	25.2	12.4	17.1	5.7
2000-20-2-206	53.3	30.5	5.8	30.5	12.4	23.5	7.6
2000-20-2-202	82.9	23.2	7.9	23.2	12.5	19.3	11.1
2000-20-2-214	38.7	25	7.4	25	12.7	21.8	6.6
2000-20-1-321	41.6	23	6.6	23	11.5	20.7	4.6
2000-20-1-350	47.7	19.4	7.1	19.4	15.9	18.6	4.4
2000-20-2-194	60.9	30.3	7.8	27.7	15.1	30.3	9.3
2000-20-2-187	46.6	32.2	7.6	32.2	15.2	21.7	11
2000-20-2-239	55.5	28	6.5	28	15.3	21.7	10.7
2000-20-2-232	51.1	28.4	8.3	28.4	15.4	25.5	9.5
2000-20-2-189	54.3	32.5	8	32.5	15.5	21.9	10.8
2000-20-2-342	64.4	33.3	7.6	33.3	13.9	21.7	11.8
2000-20-1-351	45.1	26.4	7.7	26.4	15.7	20.4	7
2000-20-2-229	36.9	22.8	7.5	17.7	15	22.7	4.6
2000-20-1-289	29.9	26.6	7.1	26.6	23.4	26.7	5.9
2000-20-2-347	67.5	28.3	9	28.3	16	26.6	15.7
2000-20-1-334	35.7	20.2	6	18.8	16	20.2	3.7
2000-20-1-320	49.2	25.7	7.3	25.7	16	22.6	8.1
2000-20-1-320	46.6	32.6	8.4	32.6	16	23.2	11.3
2000-20-2-186	63.4	34.4	6.9	34.4	16.1	22.1	15.3
2000-20-1-333	30.2	24.9	5.7	26.6	15.5	26.7	4
2000-20-1-329	44	29.1	7.5	29.1	14.6	23.3	8.9
2000-20-2-230	42.7	24.7	7.9	24.8	16.2	23.9	7.3
2000-20-1-366	57.4	29.1	6.1	28.2	14	22.7	10.1
2000-20-1-324	40.5	27.2	8	27	14	20.6	7.4
2000-20-2-350	78.2	30	6.9	30	14.1	19.5	17
2000-20-2-182	63	27.3	7.1	26.5	14.1	21.5	13.5
2000-20-2-219	54.3	29.1	8.4	29.1	14.3	27.3	7.7
2000-20-2-199	42.2	27.5	5.7	27.5	15	20.1	5.5
2000-20-2-201	134.6	32.4	10.3	30	14.4	25.4	45.5
2000-20-2-216	41.6	25.2	7	25.2	15	23.5	7

Specimen Number	Length	Width	Thick	Shoulder Width	Stem Width	Base Width	WT
2000-20-2-215	53.4	26.1	6.3	25.7	14.7	26.1	9
2000-20-2-209	57.1	29.8	7.6	29.7	14.8	25.6	13.2
2000-20-2-185	59.4	33.5	9	33.5	14.8	22.6	13.5
2000-20-2-236	56.4	25.3	6.8	25.3	14.9	24.3	8.9
2000-20-2-225	52	32.3	7.5	32.3	14.9	20.6	10.5
2000-20-2-345	55.6	31.5	9.2	31.5	14	20.7	11.6
2000-20-2-208	44.1	28.7	6.9	28.7	14.4	24.5	7.5

APPENDIX C
EARLY ARCHAIC POINT NONMETRIC DATA

Item Number	Type	Base Form	Basal Grinding	Base shape	Bevel	Serration
2000-20-1-286	BOLEN/PALM	SN	LT	INC	RH	N
2000-20-1-289	BOLEN/PALM	SN/CN	LT	INC	RH	N
2000-20-1-291	BOLEN	SN/ES	N	STR	N	N
2000-20-1-293	BOLEN/KIRK	SN/CN			RH	Y
2000-20-1-318	BOLEN/KIRK	CN	LT	EXC	RH	Y
2000-20-1-320	BOLEN/PALM	SN	HVY	STR	RH	N
2000-20-1-320	BOLEN/KIRK	ES	HVY	EXC	N	N
2000-20-1-320	BOLEN/PALM	SN	LT	EXC	RH	N
2000-20-1-321	BOLEN/PALM	SN/CN	LT	STR	N	N
2000-20-1-322	BOLEN/PALM	SN	LT	STR	RH	N
2000-20-1-323	BOLEN/PALM	SN	LT	EXC	RH	N
2000-20-1-324	BOLEN/PALM	SN	N	EXC	RH	N
2000-20-1-325	BOLEN/PALM	SN	HVY	STR	RH	N
2000-20-1-326	BOLEN/PALM	SN	LT	STR	RH	Y
2000-20-1-327	BOLEN/PALM	SN	HVY	INC	RH	Y
2000-20-1-328	BOLEN/KIRK	SN/CN	HVY	STR	RH	Y
2000-20-1-329	BOLEN/PALM	SN	LT	EXC	RH	N
2000-20-1-330	BOLEN/PALM	SN/CN	HVY	EXC	RH	Y
2000-20-1-331	BOLEN/PALM	SN/CN	HVY	EXC	RH	Y
2000-20-1-332	BOLEN/PALM	SN	HVY	INC	RH	Y
2000-20-1-333	BOLEN/PALM	SN	LT	INC	RH	N
2000-20-1-334	BOLEN/PALM	SN	HVY	INC	RH	N
2000-20-1-335	BOLEN/PALM	SN	HVY	INC	RH	N
2000-20-1-336	BOLEN/PALM	SN	HVY	INC	RH	N
2000-20-1-348	BOLEN/PALM	SN	LT	INC	RH	Y
2000-20-1-349	BOLEN/PALM	SN	LT	STR	RH	Y
2000-20-1-350	BOLEN/PALM	SN	LT	INC	RH	N
2000-20-1-351	BOLEN/PALM	CN	LT	INC	N	N
2000-20-1-352	BOLEN/PALM	SN	LT	INC	N	N
2000-20-1-353	BOLEN/PALM	SN	N	INC	N	N
2000-20-1-354	BOLEN/PALM	SN	LT	INC	N	N
2000-20-1-355	BOLEN/PALM	CN	HVY	EXC	RH	Y
2000-20-1-356	BOLEN/KIRK	CN/BN	LT	EXC	RH	N
2000-20-1-357	BOLEN/KIRK	CN	LT	EXC	N	N
2000-20-1-358	BOLEN/KIRK	CN	HVY	EXC	RH	Y

Item Number	Type	Base Form	Basal Grinding	Base shape	Bevel	Serration
2000-20-1-359	BOLEN/KIRK	CN	HVY	EXC	RH	Y
2000-20-1-360	BOLEN/KIRK	CN	LT	EXC	RH	N
2000-20-1-361	BOLEN/KIRK	CN	LT	INC	N	N
2000-20-1-362	BOLEN/KIRK	CN/BN	LT	INC	RH	N
2000-20-1-363	BOLEN/KIRK	CN/ES	HVY	INC	RH	N
2000-20-1-364	BOLEN/KIRK	CN	LT	EXC	RH	N
2000-20-1-365	BOLEN/KIRK	CN/ES	N	INC	N	N
2000-20-1-366	BOLEN/KIRK	CN	LT	EXC	N	N
2000-20-2-022	BOLEN/PALM	SN	Lt	EXC	RH	Y
2000-20-2-120	BOLEN/PALM	ST	LT	EXC	N	N
2000-20-2-124	BOLEN/PALM	SN/CN	LT	STR	N	N
2000-20-2-125	BOLEN/PALM	SN	HVY	INC	N	N
2000-20-2-128	BOLEN/KIRK				RH	Y
2000-20-2-178	WALLER	ST	LT	EXC	N	N
2000-20-2-181	BOLEN/PALM	SN	LT	STR	RH	N
2000-20-2-182	BOLEN	SN	LT	STR	N	N
2000-20-2-183	BOLEN/PALM	SN	HVY	STR	RH	Y
2000-20-2-184	BOLEN/PALM	SN/CN	LT	STR	RH	N
2000-20-2-185	BOLEN/KIRK	CN	N	STR	N	N
2000-20-2-186	BOLEN/KIRK	CN	HVY	STR	RH	Y
2000-20-2-187	BOLEN/KIRK	CN	LT	STR	N	N
2000-20-2-188	BOLEN/KIRK	CN	LT	STR	RH	N
2000-20-2-189	BOLEN/KIRK	CN	HVY	STR	RH	T
2000-20-2-190	BOLEN/KIRK	CN	LT	STR	RH	N
2000-20-2-191	BOLEN	SN	N	STR	N	N
2000-20-2-192	BOLEN/KIRK	CN	LT	STR	RH	Y
2000-20-2-193	BOLEN/KIRK	CN	N	STR	N	N
2000-20-2-194	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-195	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-196	BOLEN/PALM	SN	N	EXC	RH	N
2000-20-2-197	BOLEN/PALM	SN	HVY	EXC	RH	N
2000-20-2-198	BOLEN/PALM	SN	HVY	EXC	RH	N
2000-20-2-199	BOLEN/PALM	SN	LT	EXC	RH	N
2000-20-2-200	BOLEN/PALM	SN	HVY	EXC	RH	N
2000-20-2-201	BOLEN/PALM	SN	HVY	EXC	N	N
2000-20-2-202	BOLEN/PALM	SN	LT	EXC	RH	Y
2000-20-2-203	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-204	BOLEN/PALM	SN	LT	EXC	RH	Y

Item Number	Type	Base Form	Basal Grinding	Base shape	Bevel	Serration
2000-20-2-205	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-206	BOLEN/KIRK	SN/CN	LT	EXC	RH	Y
2000-20-2-207	BOLEN/PALM	SN	HVY	EXC	RH	N
2000-20-2-208	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-209	BOLEN/PALM	SN	LT	STR	RH	N
2000-20-2-210	BOLEN/PALM	SN	HVY	STR	RH	Y
2000-20-2-210	BOLEN/PALM	SN	HVY	STR	RH	N
2000-20-2-213	BOLEN/PALM	SN/CN	HVY	EXC	RH	N
2000-20-2-214	BOLEN/PALM	SN/CN	HVY	EXC	RH	N
2000-20-2-215	BOLEN/PALM	SN/CN	HVY	EXC	N	N
2000-20-2-216	BOLEN/PALM	SN	LT	EXC	RH	N
2000-20-2-217	BOLEN/KIRK	CN	LT	INC	RH	N
2000-20-2-218	BOLEN/KIRK	CN	LT	EXC	N	N
2000-20-2-219	BOLEN/PALM	SN	LT	EXC	RH	Y
2000-20-2-220	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-221	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-222	BOLEN/PALM	SN	Lt	EXC	N	N
2000-20-2-223	BOLEN/PALM	SN	HVY	EXC	RH	Y
2000-20-2-225	BOLEN/KIRK	CN	LT	EXC	RH	Y
2000-20-2-225	BOLEN/PINE	CN	N	INC	N	Y
2000-20-2-226	BOLEN/KIRK	CN	Lt	EXC	RH	Y
2000-20-2-227	BOLEN/KIRK	SN/CN	Lt	EXC	RH	N
2000-20-2-228	BOLEN/KIRK	SN/CN	LT	EXC	RH	Y
2000-20-2-229	BOLEN/PALM	SN	HVY	INC	RH	Y
2000-20-2-230	BOLEN/PALM	SN	HVY	INC	RH	Y
2000-20-2-230	BOLEN/PALM	SN/CN	HVY	INC	N	N
2000-20-2-231	BOLEN/PALM	SN	HVY	INC	RH	N
2000-20-2-232	BOLEN/PALM	SN	LT	INC	RH	Y
2000-20-2-233	BOLEN/PALM	SN	N	INC	RH	Y
2000-20-2-234	BOLEN/PALM	SN	N	INC	RH	N
2000-20-2-235	BOLEN/PALM	SN	LT	STR	RH	N
2000-20-2-236	BOLEN/PALM	SN	N	STR	N	N
2000-20-2-237	BOLEN/KIRK	CN	HVY	EXC	RH	Y
2000-20-2-238	BOLEN/KIRK	CN	LT	EXC	RH	N
2000-20-2-239	BOLEN/KIRK	CN	LT	EXC	RH	N
2000-20-2-280	BOLEN/KIRK	CN	N	INC	RH	Y
2000-20-2-340	BOLEN/KIRK	CN	LT	EXC	RH	Y
2000-20-2-341	BOLEN/KIRK	CN	HVY	INC	N	Y

Item Number	Type	Base Form	Basal Grinding	Base shape	Bevel	Serration
2000-20-2-342	BOLEN/KIRK	CN	HVY	EXC	RH	Y
2000-20-2-343	BOLEN/KIRK	CN	LT	EXC	RH	N
2000-20-2-344	BOLEN/KIRK	CN	LT	EXC	RH	Y
2000-20-2-345	BOLEN/KIRK	CN	LT	EXC	RH	Y
2000-20-2-346	BOLEN/KIRK	CN	LT	INC	RH	Y
2000-20-2-347	BOLEN/KIRK	CN	LT	INC	RH	Y
2000-20-2-349	BOLEN/KIRK	CN	N	INC	N	N
2000-20-2-349	BOLEN/KIRK	CN	N	INC	N	N
2000-20-2-350	KIRK	ST	LT	EXC	N	N
8Je121-Area 1	TINY BOLEN?	SN	LT	EXC	N	N
8Je121-Area 1	BOLEN/PALM	SN	HVY	INC	RH	N
8Je121-Area 15	BOLEN/KIRK	CN	HVY	INC	RH	Y
8Je121-Area 1C	BOLEN/PALM	SN	LT	INC	RH	Y
8Je121-Area 5	BOLEN/KIRK	CN	LT	EXC	RH	Y
8Je121-Area	BOLEN/KIRK	SN/CN	LT	INC	RH	Y
8Je121-Area 7S	BOLEN/PALM	SN	HVY	INC	RH	N
8Je121-Area 8E	BOLEN/KIRK	SN/CN	LT	ASYMETRICAL	N	Y
8Je121-Area 9P	BOLEN/PALM	SN	LT	STR	RH	N
8Je121-Area	BOLEN/KIRK	SN/CN	HVY	EXC	RH	Y
8Je121-NE or	BOLEN/KIRK	SN/CN	N	STR	N	N
8Je121-Ohmes	BOLEN/PALM	SN	LT	EXC	N	Y
8Je121-SE of	BOLEN/PALM	SN	HVY	INC	RH	Y
8Je121-Unit	BOLEN/PALM	SN	HVY	STR	RH	N
8Je121-Unit	BOLEN/PALM	SN	LT	EXC	RH	N
8Je121-Unit	BOLEN/KIRK	CN	LT	STR	RH	N
8Je121-Unit	KIRK	CN			LH	Y
8Je121-Unit	BOLEN/KIRK	SN/CN	HVY	EXC	RH	Y
8Je121-Unit36-	BOLEN/KIRK	CN	N	EXC	RH	N
95E-15	BOLEN/KIRK	CN	LT	STR	RH	Y
95E-17	BOLEN/KIRK	CN	LT	STR	RH	N
95E-18	BOLEN/PALM	SN	HVY	EXC	RH	Y
95E-241	BOLEN/PALM	SN	HVY	EXC	RH	Y

APPENDIX D LAND EXCAVATIONS AT PAGE/LADSON (8JE591)

Overview of Excavations

One of the less well-known aspects of the Aucilla River Prehistory Project is the investigation of terrestrial deposits on the riverbanks around the underwater sites. In the case of the Page/Ladson site, there have been three systematic excavations. Bob Carr excavated six 1m by 1m squares during one week of excavation in 1988 (Carr 1988). B. Calvin Jones excavated an area on the opposite (eastern) riverbank in 1989 (Jones 1989). Finally, two teams of volunteers excavated twenty-one 50cm x 100cm units in October, 1994, and May, 1995. In addition to encountering side-notched and lanceolate materials, all of the test pits (Figure 3.1) yielded Precolumbian artifacts, ranging from Middle Archaic period to late Prehistoric period, suggesting that the boundaries of the Page/Ladson site have not yet been accurately defined. Summaries of the artifacts recovered in each test pit are given in Appendix A.

The land excavations revealed a variety of cultural components across the site. The objective of the Carr excavations was to excavate only on the upslope and upstream sandy areas overlooking the underwater component. Most of his test units encountered bedrock limestone within 30cm of the surface, with the exception of units closest to the underwater excavation (northern-most units). The majority of artifacts recovered from his excavations were Middle to Late Archaic in age.

Jones' 1989 excavations focused on a relatively high sand ridge on the east bank of Half Mile Rise. He confirmed the basic sequence of occupations had been established

on the underwater site, with pronounced peaks in temporally-diagnostic artifacts representing the Late Paleoindian, Middle Archaic, and Deptford periods. Most interestingly, he recovered Paleoindian diagnostics in what had previously been thought as Miocene to Middle Pleistocene, non-cultural clays. A similar feature was observed on the Santa Fe river, where water-tumbled deposits---possibly lag deposits---were noted above much older clays (Milanich 2002, personal communication).

Due to the strong evidence of occupation around the underwater site, a testing pattern for the 1995 excavations was developed that would address any potential fall-off in archaeological remains away from the active river channel, thereby establishing site boundaries. To accomplish this, a 50m wide corridor on each side of the river was divided into a 20m wide near-bank corridor and an abutting 30m corridor. Lines perpendicular to the bank and spaced 30m apart were used to place four test units on each bank. Two units were placed at random distances from the bank within the 20m swath; another two were placed in the adjacent 30m swath (see Figure 3.1 for placement of test pits). Late Paleoindian/Early Archaic diagnostic materials were recovered from two of the 21 test units (Figures D.1, D.2, D.3). On the basis of the positive test units within the 20m corridor adjacent to the riverbank and the lack of materials away from the bank, it appears that the Paleoindian component of the Page/Ladson site is localized around the submerged part of the site. However, Middle Archaic and Deptford remains were more concentrated on the eastern bank of Half-Mile Rise. One test unit (AE-4) yielded a range of stone tools, flakes, and pottery remains (see Appendix A) that likely date to the Middle to Late Archaic.

Profiles of each test unit excavated during the 1994-1995 season were drawn, as well as planview drawings when required (Figures D.4 through D.20). In test units AW1 and AW2, deposits corresponded to the relatively normal set of surficial sediments found on the Gulf Coastal Lowlands (Coastal Environments, Inc. 1977:10-18), namely a roughly 10cm organic mat overlying 80 to 150cm of white sand that fades into an oxidized, iron-rich yellow sand, which in turn overlies a BT horizon of alluvially-deposited clays. In test pits BW2, BW3, and BE1, much of the sediment has been stripped off the underlying bedrock, leaving a 10cm-20cm sandy, organic-rich A horizon that immediately overlies a thin yellow sand and bedrock. In test units AE1 and AE2, the gray to white sand that homogeneously covers bedrock and Plio-Pleistocene clays gives way to a yellow sand at around 75cm below surface. Test Unit AE3 and AE4 consists of gray sand directly overlying limestone bedrock

Several important observations were made on the basis of soil depths, recovered artifacts, and test unit placement. First, test units BW1 and BW2 could be excavated only to average depths of 50cm and 30cm, respectively. Bedrock was immediately encountered. Compared to other test units (e.g. AW2 and AE2 through AE4), where a sequence of humus, sand, and clay was found, it seems likely that local flooding from the Wacissa drainage stripped the limestone/dolomite ridge immediately above the underwater component of the site. The modern Wacissa enters the Aucilla at various points, including just north of the Page/Ladson site (Figure 3.1). It is likely that lowered aquifer levels combined with slightly higher-than-modern rainfall in the Wacissa drainage would result in higher stream flows and subsequent water-stripping of terraced sediments in the vicinity of the modern confluence. The landscape would have been

especially vulnerable to episodic water-stripping if the local climate were generally drier and better drained (i.e., lowered water table). The massive gray clay beds above and below the submerged "Bolen level" suggest that these colluvial depositional events likely occurred during the latest Pleistocene and Early Holocene.

Fluctuations in the soil moisture and water table levels appear to have caused other modifications to the excavated soils. In test units AE1, AE2, AE4, and BW2, the lowest sand level above Pleistocene clays was an orange (5YR6/8), clayey sand. This soil was associated with Early Archaic diagnostics in AE1 and BW2. The phenomenon of yellow to orange sands being associated with early diagnostics is relatively well-known to professionals and amateurs, alike. James Dunbar (1997, personal communication) reports that site preparation workers for the large plantation pine companies often recognize and recover Paleoindian and Early Archaic points from these orange-colored sands at a much higher rate than from other types of sands during preparation furrowing in northwest Florida. Numerous investigators have noted that Paleoindian and Early Archaic lithic materials from both these orange sands and from deeply buried sandy-clays are highly weathered, or patinated (see Purdy 1981:82, 86). At Harney Flats, Late Paleoindian and Early Archaic materials were recovered from below a hardpan of Leon Fine sands (Daniel and Weisenbaker 1987:33).

The deeply-patinated condition of the side-notched and lanceolate points from the land excavations can be explained in three ways. First, the artifacts could have lain in a shallowly-buried or exposed position for several thousand years before soil moisture levels were high enough and steady enough to keep water trapped in the chert from escaping (Purdy 1981:82-83). This would have exposed the stone to substantial leaching

from being wetted and dried. Evidence of the length of time the points were exposed to leaching can be found in the iron oxide/sand concretions that adhere to the bottom of lithic materials from Early Archaic contexts (Scudder 1999). Second, it is possible that even when the lithic remains were buried in deep sands, the soils were dry enough to continue the patination process. Finally, the relatively deep burial contexts of some Paleoindian and Early Archaic remains could have resulted in them being wetted and dried regularly once aquifer levels reached essentially modern levels, resulting in the bearing off of soluble materials.

The minimal patination of side- and corner-notched points from the underwater levels (e.g. 95E-15, 95E-17, 95E-18) suggests that exposure and periodic wetting within a generally dry, sandy soil may promote patination, while burial in consistently hydrated or clay-rich sediments reduces patination. Additional evidence for these trends has been observed in Pleistocene/Early Holocene artifacts from other sandy sites (Bullen and Dolan 1959, Neill 1958, Austin and Mitchell 1999) and artifacts recovered from river-bottom sites in Northwest Florida (Dunbar, personal communication 1997).

The highly patinated artifacts from Page/Ladson land units seem to have picked up an orange secondary stain of iron-rich minerals. Although it is not entirely clear when the staining occurred, it may be associated with the establishment of modern water levels. Often, the soil matrix from which these orange-stained stone tools are recovered is also orange, an indication that certain soil processes may be differentially oxidizing iron within the soils.

Artifact analysis

The following section summarizes and discusses the significant Early Archaic age artifacts recovered and analyzed (Appendix A) from the 1994-1995 land excavations, and briefly discusses the Deptford component of the same excavations.

Ceramics

A majority of the ceramic vessel fragments recovered from the land excavations dates to the Deptford period and consists of Deptford Linear Check and Deptford Simple Stamped. The Deptford occupation of the terrestrial component of the Page/Ladson site appears to correlate with Deptford ceramics from a red, clay-rich layer on the underwater component of the site. A heavy concentration of Deptford ceramics was noted in a 5-7cm band of organic-rich red clay that is a subcomponent of Sedimentary Unit 7 of the underwater component. In the Aucilla/Wacissa drainage, the only source of this type of clay is through the Aucilla drainage. This suggests that there may have been extensive clearing and subsequent erosion in the Miccosukee Hills subregion of the Tallahassee Hills, the source area of the Aucilla. This would correspond well with the observation of increased inland village sites during the Deptford period (Milanich 1994:134). Although it is unclear whether the clearing was for obtaining firewood, garden lands, or for some other purpose, it is a good sign of a fundamental change in the intensity of human activity in the headwaters of the Aucilla River around 2,500 BP.

Projectile point/knives

Two Late Paleoindian/Early Archaic points were recovered from Test BW2 during the 1994 field season (Figures D.1-D.2), and one hafted knife was recovered from Test AE1 (65cmbs) (Figure D.3). The lanceolate point from BW2 is similar to unfluted lanceolate points called Tallahassee points recovered from other Paleoindian sites in the

Southeast US. The other two points fit within a generalized Early Archaic point assemblage. Metric data on these points are presented in Appendix B as part of the Ohmes Collection point measurements.

Features

Only two features were encountered during test pit excavation, one in Unit AE4 (Figure D.9), the other in CW2 (Figures D.18-D.19). The former consisted of a small pit filled with ash, small non-cortical flakes, and sand. It originated at around 35cmbs, suggesting it dates to either the Deptford period or Late Archaic period. The latter feature also originated at around 35cm below surface, but included stacks of Deptford Simple Stamped pottery and charcoal. Encountering two likely Deptford period features in such limited testing suggests there is a significant, undisturbed Deptford-period occupation of the site.

Results of Land Excavation

There are several conclusions to draw from the land excavations. First, there is ample evidence from the intact and temporally-ordered profiles that in situ Late Pleistocene/Early Holocene terrestrial deposits exist all around the underwater component of the Page/Ladson site. This results presented in this chapter have only hinted at the terrestrial archaeological potential of the site. Early Archaic components likely lie to the south of the underwater portion of the site in the deep sands on the east bank of the Half-Mile Rise. Second, the terrestrial deposits may also contain intact features. Only limited numbers of features have been found on sites where Early Archaic materials were recovered (e.g., Wakulla Springs [Jones and Tesar 2000, 8Le2105 [Hornum et al. 1996], 8Lf54 [Austin and Mitchell 1999]). Excavations at the Page/Ladson site that expose large numbers of features from the Early Archaic period

will add to our understanding of Early Archaic site structure, as well as tool manufacturing and use processes. Third, excavations helped answer questions about Early Archaic site boundaries.

To the immediate east of the underwater component, there were no Early Archaic materials. However, the site appears to extend to the west at least 40m, to the south on the west bank for at least 50m, and to the southeast on the east bank for at least 50m, into both water-stripped and deep sand deposits.

To conclude, analysis of the materials recovered in Carr's and Jones' excavations should be carried out and reported. This would serve to supplement the information presented here. Finally, a high priority should be given to delimiting the remaining site boundaries for both the Deptford and Early Archaic components.

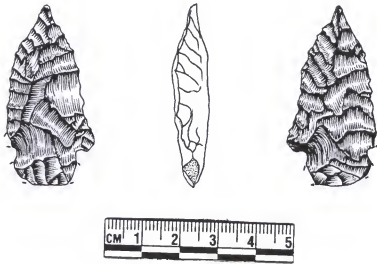


Figure D.1. Hafted tool 94B-6.2.1 from 35 cmbs in Test BW2 (Drawing by Mason Sheffield)

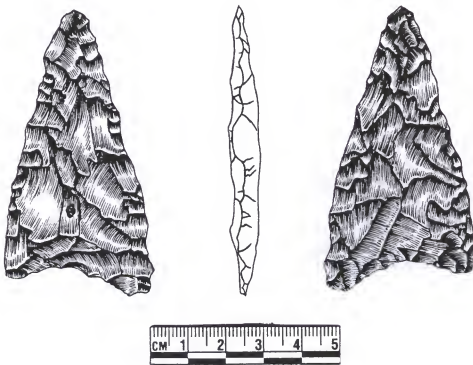


Figure D.2. Hafted lanceolate 94B-6.2.2 from 35 cmbs in Test BW2 (Drawing by Mason Sheffield)

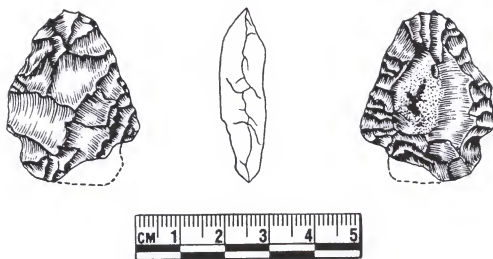


Figure D.3. Hafted tool 94B-12.2.13 from 65 cmbs in Test AE1 (Drawing by Mason Sheffield)

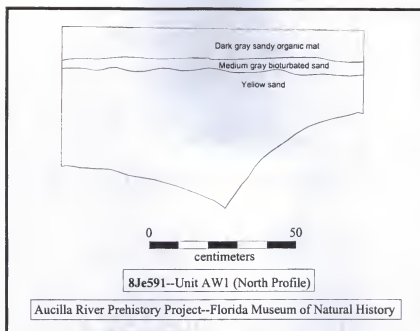


Figure D.4. Profile drawing of Test AW1

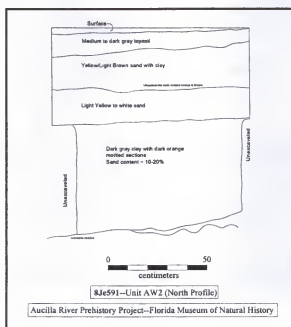


Figure D.5. Profile drawing of Test AW2

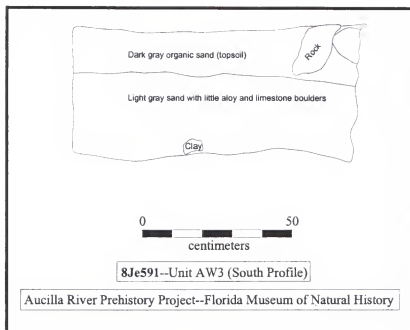


Figure D.6. Profile drawing of Test AW3

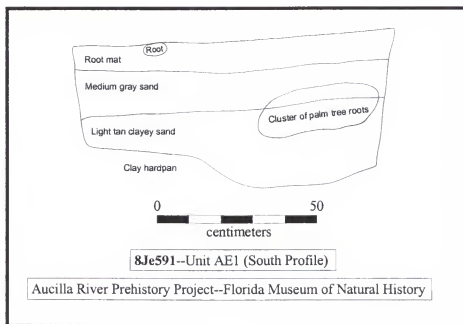


Figure D.7. Profile drawing of Test AE1

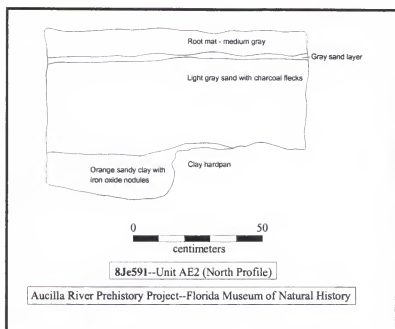


Figure D.8. Profile drawing of Test AE2

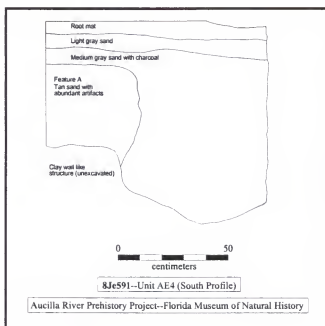


Figure D.9. Profile drawing of Test AE4

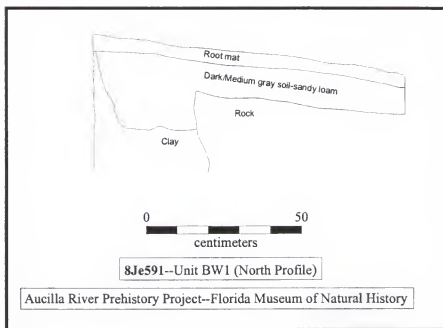


Figure D.10. Profile drawing of Test BW1

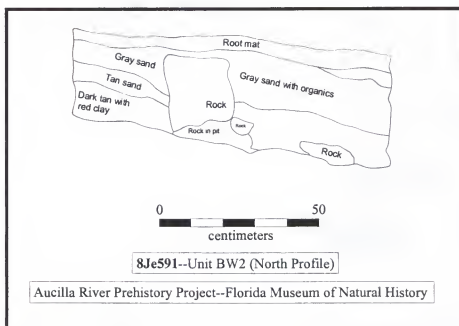


Figure D.11. Profile drawing of Test BW2

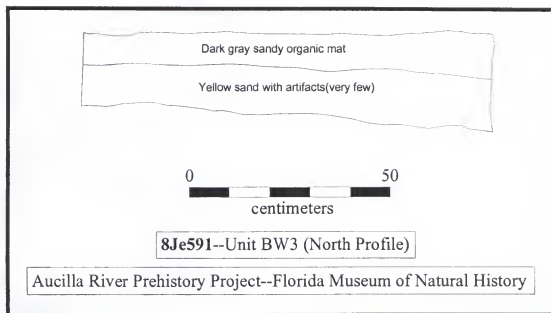


Figure D.12. Profile drawing of Test BW3

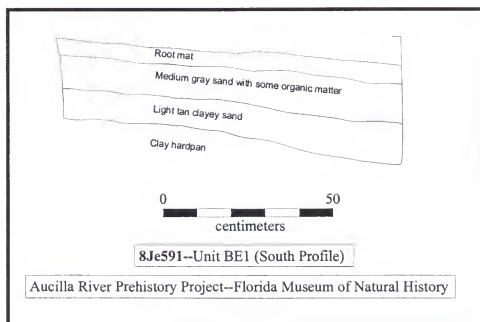


Figure D.13. Profile drawing of Test BE1

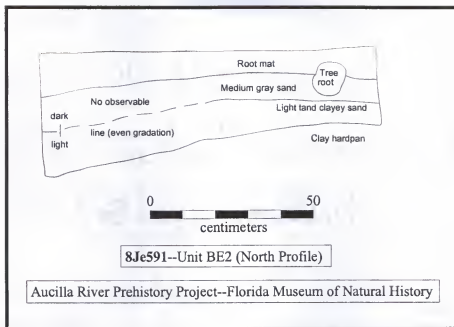


Figure D.14. Profile drawing of Test BE2

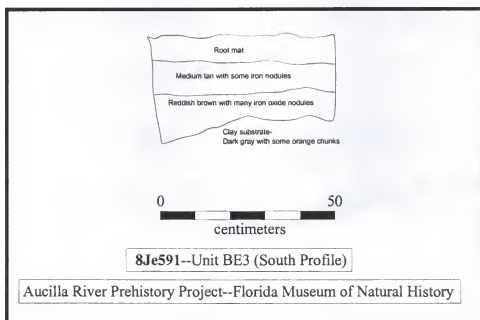


Figure D.15. Profile drawing of Test BE3

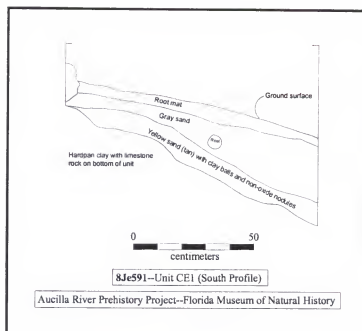


Figure D.16. Profile drawing of Test CE1

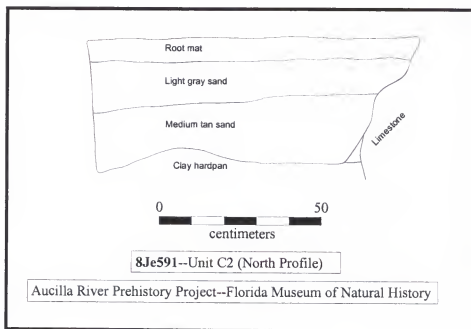


Figure D.17. Profile drawing of Test CE2

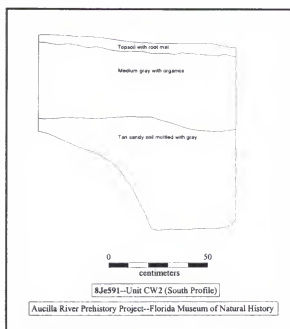


Figure D.18. Profile drawing of Test CW2

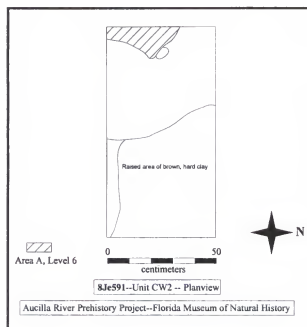


Figure D.19. Planview drawing of fully excavated Test CW2

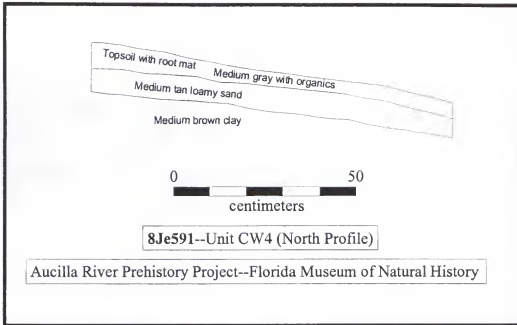


Figure D.20. Profile drawing of Test CW4

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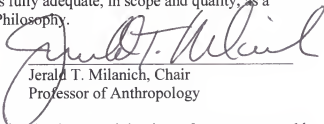
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



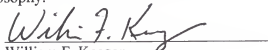
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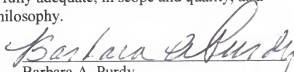
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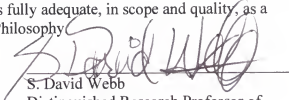
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This dissertation was submitted to the Graduate Faculty of the Department of Anthropology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

May 2003

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